MISSISSIPPI
STATE GEOLOGICAL SURVEY

WILLIAM CLIFFORD MORSE, Ph.D.
Director

BULLETIN 79

LOWER CRETACEOUS STRATIGRAPHY OF MISSISSIPPI

by

JEFF DORRIS NUNNALLY and HENRY FLOREY FOWLER

UNIVERSITY, MISSISSIPPI

1954

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Reprinted

1965

MISSISSIPPI GEOLOGICAL SURVEY

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LETTER OF TRANSMITTAL

Office of the Mississippi Geological Survey
University, Mississippi
May 10, 1954

To His Excellency,
Governor Hugh Lawson White, Chairman, and
Members of the Geological Commission

Gentlemen:

The Science of Geology, the Petroleum industry, and the State of Mississippi owe a lasting debt of gratitude to Jeff Dorris Nunnally and Henry Florey Fowler, geologists of the Gulf Refining Company, and to the Company Officials and the Company itself, for placing at the publication disposal of the Mississippi State Geological Survey this paper, the "Lower Cretaceous Stratigraphy of Mississippi," without cost to the State. Although the Junior Author presented orally the contents of the paper to the Mississippi Geological Society, most of the data can be made permanently available to the public and to the scientific world only through publication.

Very sincerely yours,

William Clifford Morse
Director and State Geologist

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LOWER CRETACEOUS STRATIGRAPHY OF MISSISSIPPI

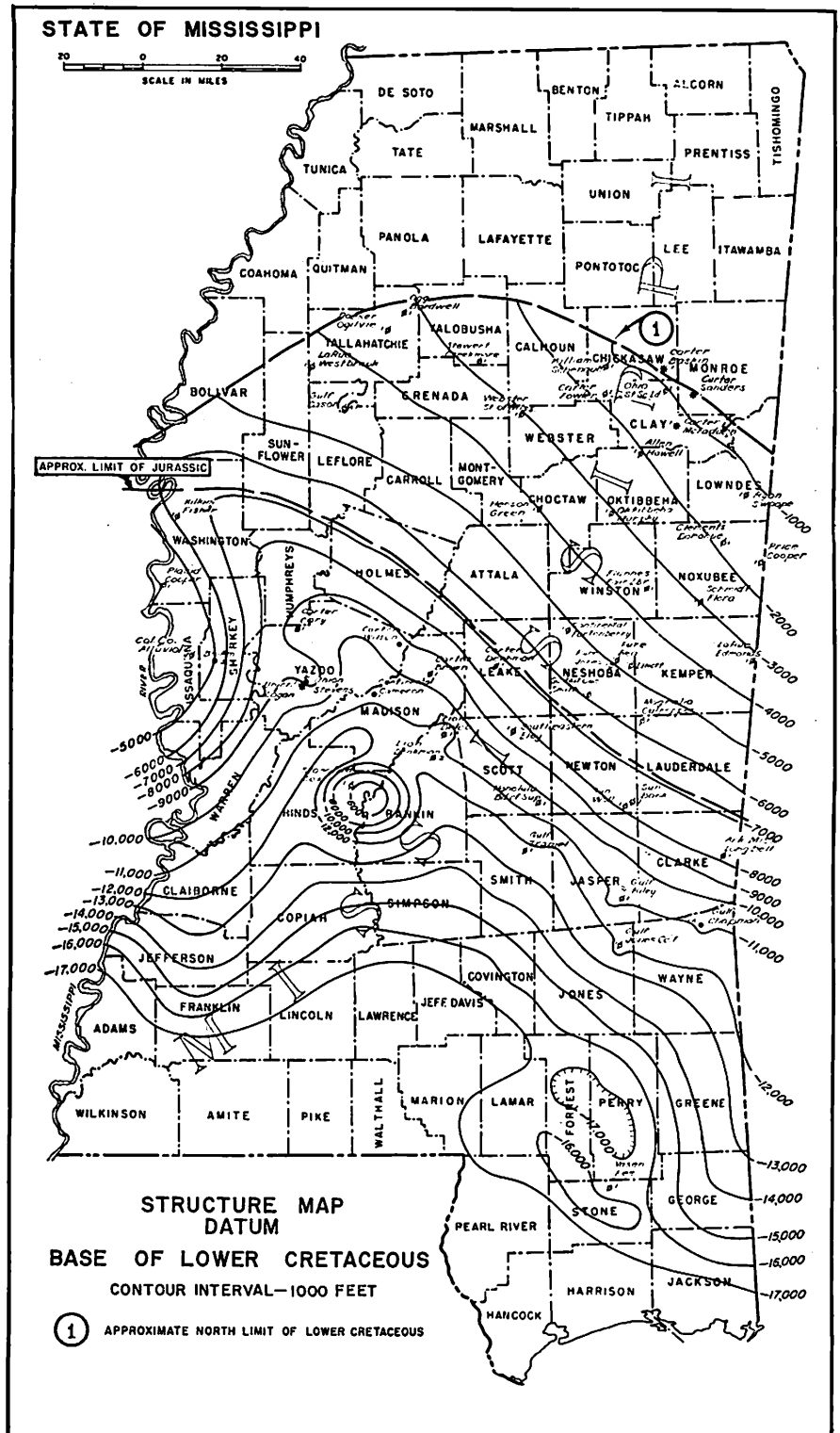
JEFF DORRIS NUNNALLY AND HENRY FLOREY FOWLER

ABSTRACT

The Lower Cretaceous of Mississippi is present only in the subsurface. It is composed of the Comanche series alone, or of the combined Comanche and Coahuila series. In Southern Mississippi, some Lower Cretaceous groups and formations can be recognized, by electric and lithologic characteristics, as being equivalent to units in Louisiana where the stratigraphic sequence is more firmly established. Key beds of the Lower Cretaceous of southern Mississippi are the Washita and Fredericksburg limestones and the Ferry Lake anhydrite. The Ferry Lake anhydrite was not deposited northeast of a line from central Issaquena County to northeast Greene County. Washita and Fredericksburg limestones are not present north of a line between Claiborne County and Greene County. North of this line Washita and Fredericksburg rocks are clastic, and are difficult to recognize because of the absence of limestones and the lithologic similarity between them and the overlying and underlying strata. Eight structures in Mississippi have produced oil or gas from Lower Cretaceous sediments. Favorable reservoir rocks and good structures exist in Mississippi, hence additional Lower Cretaceous exploration is justified.

INTRODUCTION

Existing deep well data provide only a partial understanding of Lower Cretaceous stratigraphy in Mississippi. The beds referred to are post-Cotton Valley (Upper Jurassic) and pre-Lower Tuscaloosa (Gulf Cretaceous) in age. The term "Lower Cretaceous," as used herein, refers to either the Comanche series or the combined Comanche and Coahuila series. In Northern Mississippi where the entire sequence is clastics, the two series have not been differentiated and it is possible the Coahuila series is missing. The lower boundary of the Coahuila series, in the southern and central parts of the state, is defined as the contact of basal Hosston conglomeratic sands and the Cotton Valley varicolored and ochre shales. In northern Mississippi, the basal Hosston oversteps the progressively older Upper Jurassic beds and comes to rest on Paleozoic rocks. The upper boundary of the Lower Cretaceous, in most of the state, is the unconformable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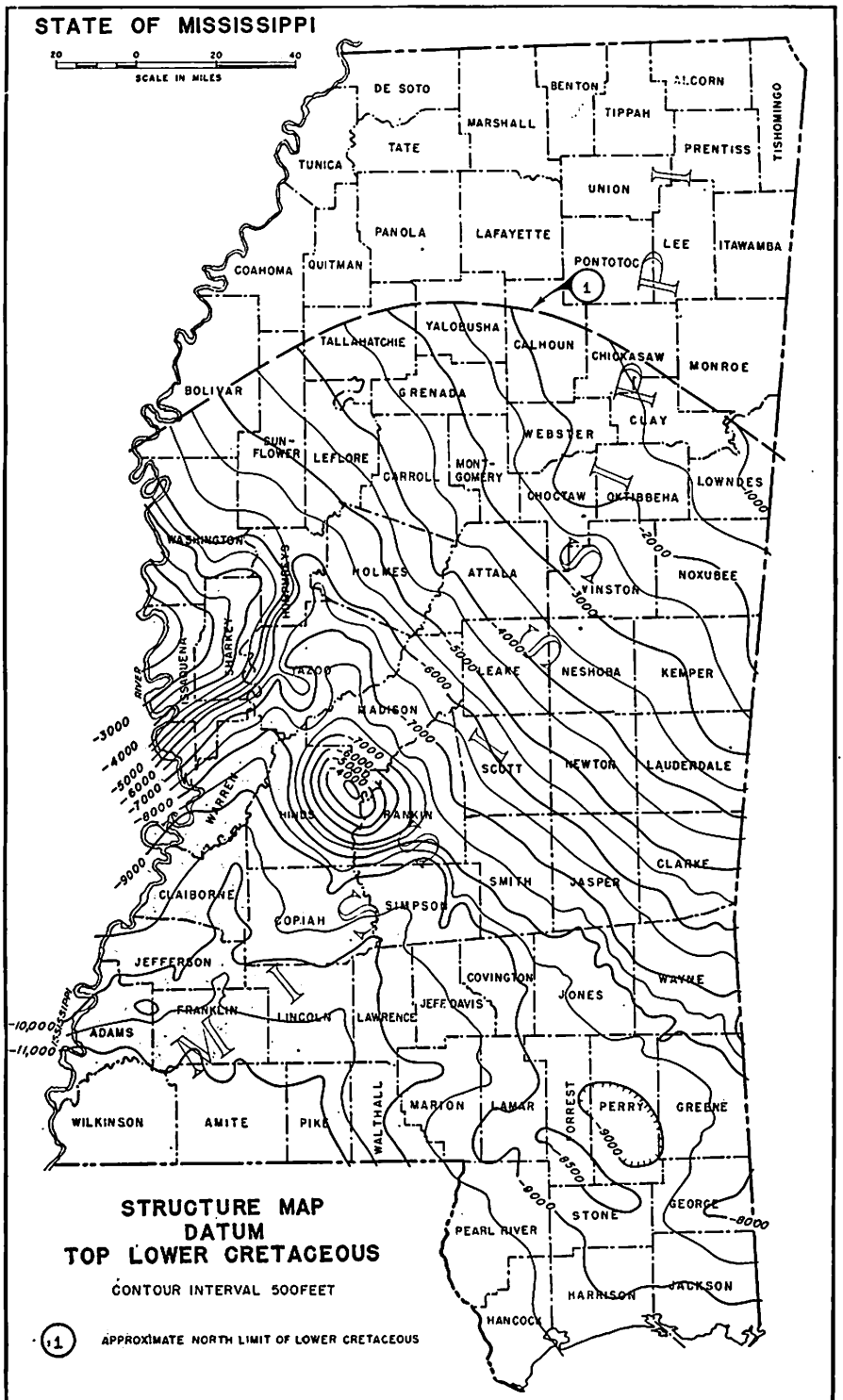
STRUCTURE MAP
DATUM
BASE OF LOWER CRETACEOUS
CONTOUR INTERVAL—1000 FEET
1 APPROXIMATE NORTH LIMIT OF LOWER CRETACEOUS
PLATE I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JEFF DAVIS
JONES
ADAMS
WILKINSON
AMITE
PIKE
WALTHALL
MARION
LAMAR
FORREST
PERRY
GREENE
STONE
GEORGE
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-9000
-10,000
-11,000
STRUCTURE MAP
DATUM
TOP LOWER CRETACEOUS
CONTOUR INTERVAL 500FEET
1 APPROXIMATE NORTH LIMIT OF LOWER CRETACEOUS
PLATE 2

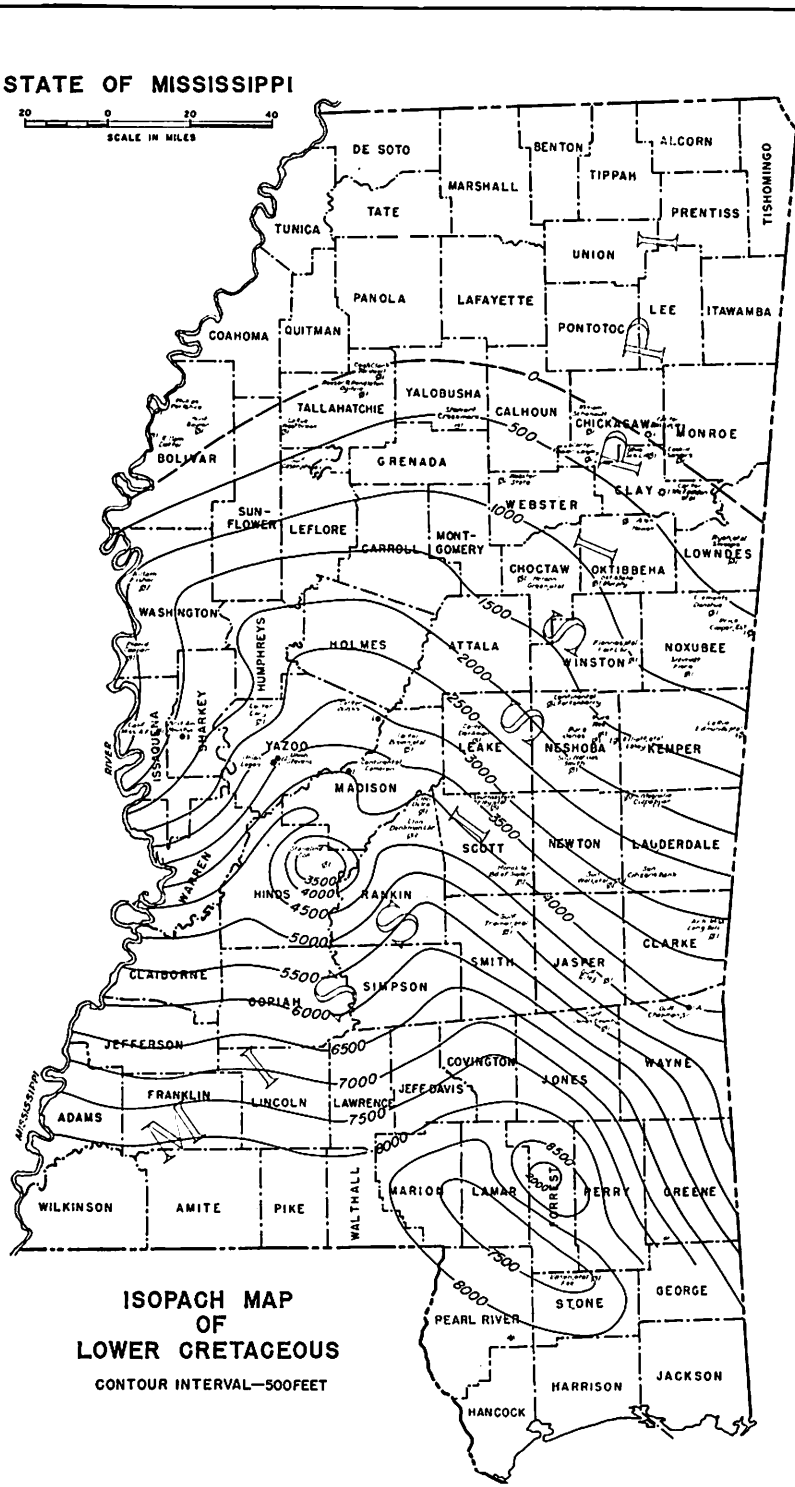
contact between the Lower Tuscaloosa basal conglomeratic sands and the eroded surface of the Dantzler formation, older formations of the Washita group, and possibly older Lower Cretaceous beds of Fredericksburg and Trinity ages.

In Sharkey, Washington, and Issaquena Counties, along the west-central part of the state and on the east flank of the Monroe Uplift, the Lower Cretaceous beds have been subjected to considerable erosion. Locally, the entire Lower Cretaceous has been removed. Gulf Cretaceous beds overstep these eroded sediments and come to rest on Jurassic limestones of Smackover age. The Jackson Uplift, in Hinds and Rankin Counties, illustrates a similar stratigraphic relationship, in that beds of Navarro age (Jackson Gas Rock) rest unconformably on sands and shales of Lower Cretaceous age. Both these areas are associated locally with post-Comanchean igneous activity.

The structure contour map (Plate 1) is based on the subsea depths of the base of the Lower Cretaceous. In the area where Jurassic rocks are present, the datum is the Hosston-Cotton Valley contact or the Hosston-Smackover contact. North of the feather edge of the Jurassic, the Lower Cretaceous rests on Paleozoic rocks. The interpretation of the structural configuration of the upper surface of the Lower Cretaceous is (Plate 2) except for greatly uplifted areas, such as the Jackson and Monroe Uplifts, based on the contact between Lower Tuscaloosa and Lower Cretaceous. On these uplifts, the Lower Cretaceous beds are overstepped by younger (Tuscaloosa to Jackson Gas Rock) formations of the Gulf Cretaceous.

A maximum known thickness of 7,526 feet of Lower Cretaceous sediments has been penetrated in the Vasen et al No. 1 Fee well in Stone County, Mississippi. Other deep tests indicate a maximum thickness of Lower Cretaceous sediments in excess of 9,000 feet. The Lower Cretaceous sediments thin northward to a feather edge where Gulf Cretaceous beds overlap the entire sequence. The thickness variations of these subsurface sediments range from practically zero to 9,000 feet (Plate 3).

From the correlation chart of Lower Cretaceous formations in Mississippi with seven other known areas (Plate 4), it may be noted that the formations of the Washita group and the Fredericksburg group cannot be separated nor can the two groups be differentiated. The lower part of the Trinity group (James



ISOPACH MAP OF LOWER CRETACEOUS

CONTOUR INTERVAL—500FEET

PLATE 3

limestone and Pine Island shale equivalents) cannot be distinguished from the Rodessa formation. The Sligo, as a formation, has not been recognized in Mississippi by means of its electric and lithologic characteristics.

Two factors make it difficult to determine formation and group contacts: 1) lateral changes in lithology between the type localities and the State of Mississippi, and 2) a dearth of diagnostic fossils in the Lower Cretaceous.

The top of the Lower Cretaceous, in the Gulf Coastal areas and northern Mexico, is the top of the Comanche series. The upper part of the Comanche series includes beds of Lower Cenomanian age. The Gulf-Comanche contact is within the Cenomanian. The major break in sedimentation in the Gulf Coastal areas and northern Mexico occurred within the Cenomanian time interval.

The Paluxy formation at the type locality, Paluxy, Texas, was originally defined as uppermost Trinity by Robert T. Hill.[1] Lozo[2] interprets the type Paluxy of Hill to be a sandstone facies of Lower Fredericksburg age. In Caddo Parish, Louisiana, a group of Paluxy-like beds, of approximately 1500 feet in thickness, may be divided into an upper part of Fredericksburg age and a lower part of Glen Rose age. Present data are insufficient to make a similar division of the Comanche rocks in Mississippi. The sequence herein designated as Paluxy in Mississippi is correlated with the Paluxy of north Louisiana.

STRATIGRAPHY

HOSSTON FORMATION

The Hosston formation of southern Mississippi, which consists of alternating beds of sandstone, shale, and mudstone, is more easily correlated with the type Hosston formation of north Louisiana on basis of its lithological assemblages. The formation is stratigraphically below limestones which may be either Trinity or Sligo in age and above sands and shales of the Cotton Valley group (Upper Jurassic). The Hosston sandstones are white to reddish white, light to dark red, pink, pale green, greenish-gray, and green in color. Grain sizes are very fine, fine, medium, and coarse. Some beds are nonporous; others are slightly to very porous. Some beds are calcareous, micaceous, and sparingly lignitic. Others may be argillaceous, silty, and contain claystone

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PLATE 4

CORRELATION OF LOWER CRETACEOUS OF MISSISSIPPI WITH OTHER AREAS

TIME ROCK SCALE: ERA	SYSTEM	EUROPEAN EQUIVALENT	SERIES	GULF COAST AND MEXICO	SUBSURFACE OF SOUTH TEXAS	OUTCROP CENT. MIN. REGION OF TEXAS	OUTCROPS OF NOR. CENTRAL TEXAS	OUTCROPS OF SO. ARKANSAS	SUBSURFACE OF ARK-LA-TEX AREA	SUBSURFACE OF MISSISSIPPI	SUBSURFACE OF ALABAMA
MESOZOIC	LOWER CRETACEOUS	CENOMANIAN	COMANCHE SERIES	WASHITA GROUP	BUDA LIMESTONE GRAYSON SHALE GEORGETOWN LIMESTONE	BUDA LIMESTONE GRAYSON SHALE GEORGETOWN LIMESTONE	BUDA LIMESTONE GRAYSON SHALE MAINSTREET LS. PAWPAW FM. WENO LIMESTONE DENTON CLAY FORT WORTH LS. DUCK CREEK LS.	ABSENT	SOUTH TYLER FORM. BUDA LIMESTONE GRAYSON SHALE GEORGETOWN LIMESTONE	DANTZLER FM. WASHITA AND FREDERICKSBURG GROUPS	DANTZLER FM. WASHITA AND FREDERICKSBURG GROUPS
		ALBIAN — LOWER CENOMANIAN									
		ALBIAN — UPPER ALBIAN									
		ALBIAN — MIDDLE ALBIAN		FREDERICKSBURG GROUP	KIAMICHI FORMATION EDWARDS LS. COMANCHE PEAK LIMESTONE AND WALNUT CLAY	KIAMICHI FORMATION EDWARDS LS. COMANCHE PEAK LIMESTONE AND WALNUT CLAY	KIAMICHI FORMATION EDWARDS LS. COMANCHE PEAK LIMESTONE WALNUT CLAY	KIAMICHI FORMATION GOODLAND LIMESTONE NOT IDENTIFIED	KIAMICHI FORMATION GOODLAND LIMESTONE WALNUT CLAY		
		ALBIAN — LOWER ALBIAN		TRINITY GROUP	GLEN ROSE LIMESTONE SHINGLE HILLS FORMATION: GLEN ROSE LIMESTONE MEMBER; HENSELL SAND MEMBER		PALUXY FM. GLEN ROSE LS. BASAL SAND	PALUXY FM. DEQUEEN LS. HOLLY CREEK FORMATION (ULTIMA THULE GRAVEL)	PALUXY FM. MOORINGSPORT FM. FERRY LAKE ANHY. RODESSA FORMATION	PALUXY FM. MOORINGSPORT FM. FERRY LAKE ANHY. RODESSA FORMATION AND LOWER TRINITY	PALUXY FM. AND TRINITY GROUP UNDIFFERENTIATED
		APTIAN — GARGASIAN			PEARSALL FORMATION: SHALE; COW CREEK MBR.; PINE ISLAND SAND MEMBER	TRAVIS PEAK FORMATION: COW CREEK LS. MEMBER AND SYCAMORE SAND MEMBER		DIERKS LIMESTONE DELIGHT SAND PIKE GRAVEL	JAMES LIMESTONE PINE ISLAND SHALE		
		APTIAN — BEDOULIAN	COAHUILA SERIES	NUEVO LEÓN GROUP NORTHERN MEXICO	SLIGO FM				SLIGO FM	NOT RECOGNIZED	NOT RECOGNIZED
		NEOCOMIAN — BARREMIAN			HOSSTON FORMATION	ABSENT	ABSENT	ABSENT	HOSSTON FORMATION	HOSSTON FORMATION	HOSSTON FORMATION
		NEOCOMIAN — HAUTERIVIAN		DURANGO GROUP OF MEXICO							
		NEOCOMIAN — VALANGINIAN									
		NEOCOMIAN — BERRIASIAN									

REFERENCES: V.E.BARNES, UNIV. OF TEX., P.I. NO.2, 1948 AND
R.W.IMLAY, BULL. AAPG VOL.29, NO.10 P.1416
S.E. LOZO, GUIDEBOOK 17, SHREVEPORT GEOL. SOC.

pebbles. The shales are varicolored reds, maroons, and grays. They are silty, sandy, hard, micaceous, carbonaceous, and sparingly fossiliferous, and include nodules of lime which may be gray, greenish-gray, or red in color. The mudstones are varicolored grays and reds, maroon, and mottled; they are hard, in many places, sandy, micaceous, and silty. Some are lignitic and contain nodules of limestone.

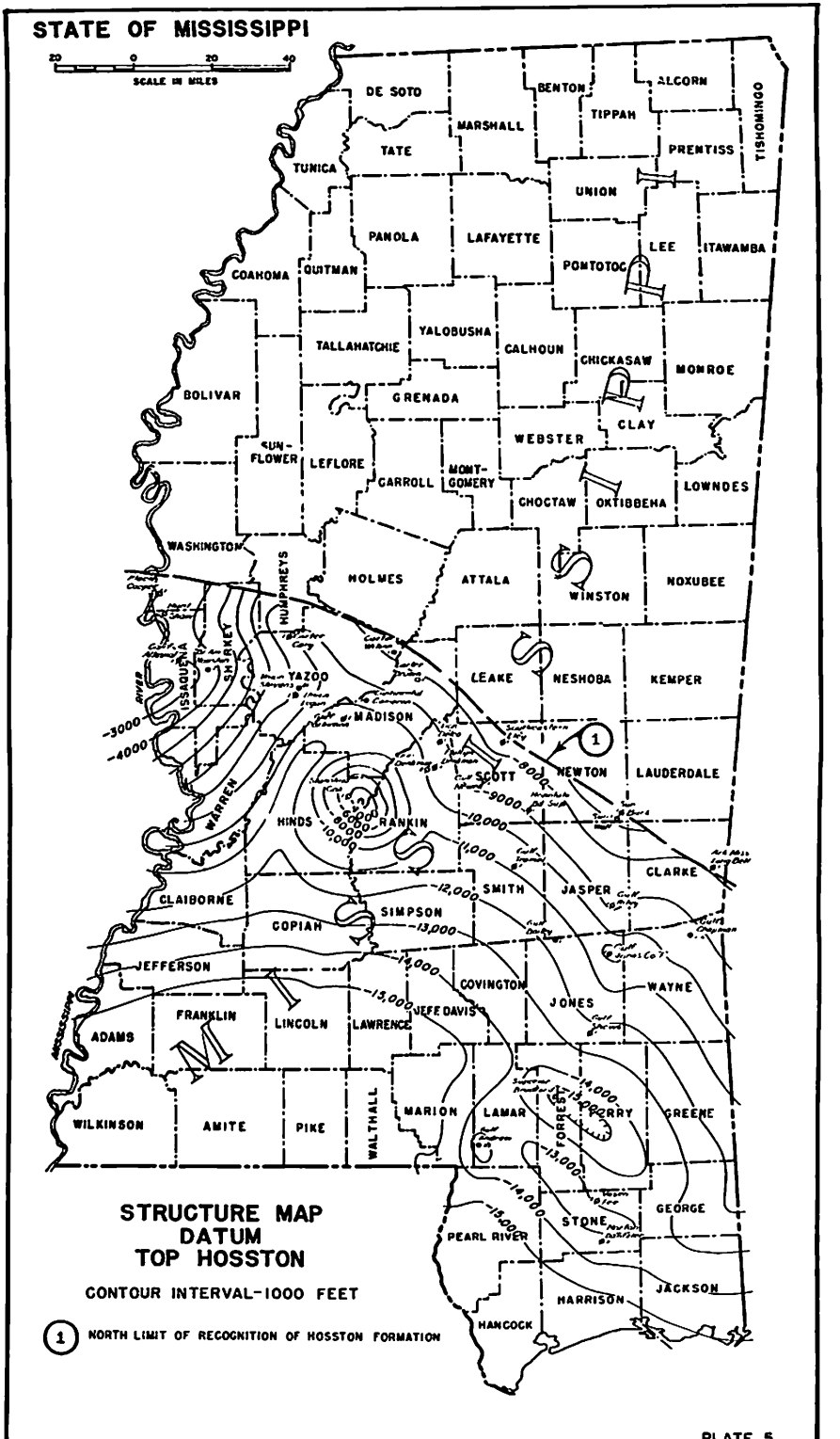
In southern and central Mississippi, the base of the Lower Cretaceous (base of Hosston) rests on a sequence of alternating beds of sandstone, shale, and mudstone of the Cotton Valley group (Upper Jurassic). The Cotton Valley sandstones are light gray, fine to medium-grained, nonporous to porous, calcareous, silty, micaceous, and sparingly fossiliferous in part. The shales are light to dark red, reddish purple and purple, gray, and mottled in color and are silty, micaceous, sparingly fossiliferous, hard, and waxy. The colors of the mudstones are: Gray to green, red and gray mottled, purple, ochre, lavender, and pastel shades of these colors. Many of the mudstone beds are hard, silty, micaceous, sandy, and waxy with siderite concretions. In central Mississippi, the Cotton Valley group contains beds of quartz and chert gravel. The Lower Cretaceous oversteps the Cotton Valley to the north and eventually comes to rest on Paleozoic rocks.

Northward from southern Mississippi, the Comanche beds above the Hosston change in lithology from limestones and shales to sandstones and shales. The lack of limestone in the Comanche series of the northern area makes the determination of the top of the Hosston questionable. In central Mississippi, the top of the Hosston must be determined from lithologic differences between Hosston sands and shales and the overlying lower Trinity sands and shales.

The most striking facies change of the Hosston from southern Mississippi northward is the increase in quartz and chert gravel content of the formation.

The maximum known thickness of Hosston penetrated in Mississippi is 2,655 feet as found in the George Vasen et al No. 1 Fee well, Stone County, between the depths of 13,605 and 16,260 feet. This well is located on the Wiggins anticline.

The regional structural configuration of the top of the Hosston formation (Plate 5) shows four major structural features: 1) Wig-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MONT-GOMERY
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WARREN
HINDS
RANKIN
SMITH
JASPER
CLARKE
CLAIBORNE
SIMPSON
COPIAH
JEFFERSON
COVINGTON
WAYNE
JONES
FRANKLIN
LINCOLN
LAWRENCE
JEFF DAVIS
ADAMS
WILKINSON
AMITE
PIKE
WALTHALL
MARION
LAMAR
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STONE
GEORGE
PEARL RIVER
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STRUCTURE MAP
DATUM
TOP HOSSTON
CONTOUR INTERVAL-1000 FEET
1 NORTH LIMIT OF RECOGNITION OF HOSSTON FORMATION

PLATE 5

gins anticline, 2) a large syncline in Forrest and Perry Counties, 3) Jackson Uplift, and 4) Monroe Uplift.

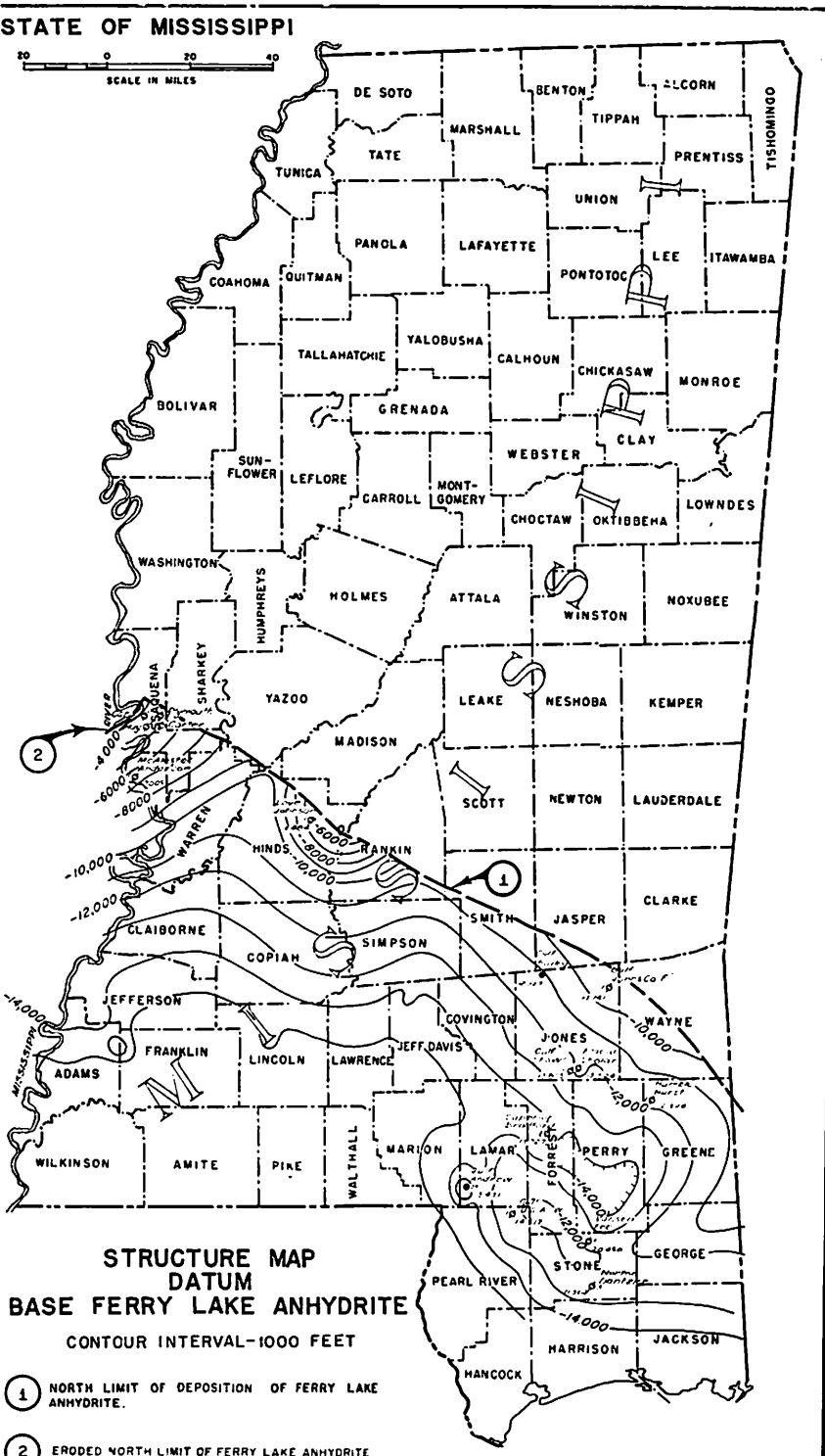
More than forty wells have tested Hosston sands. One of these, the Continental Oil Company No. 1 J. R. Cameron well in Madison County, discovered the Virlillia field. Seven other wells, throughout the state, have encountered shows in the Hosston.

UNDIFFERENTIATED SLIGO, LOWER TRINITY, AND RODESSA

The type section of the Sligo formation is in a well in the Sligo field of Bossier Parish, Louisiana. In this field the formation consists of a limestone and shale sequence, 370 feet thick, intervening between the top of the Hosston formation and the base of the Pine Island shale. Eastward from the Sligo field, the Sligo formation undergoes a facies change to a sand and shale sequence. The Sligo formation, of northern Louisiana, is not recognized in Mississippi on the basis of electrical and lithological characteristics.

The Sligo formation, undifferentiated lower Trinity, and Rodessa formation, as a rock unit, are more easily recognized in southern Mississippi where the Ferry Lake anhydrite is present. These beds consist of limestones, shales, and sands with several anhydrite stringers approximately 60 feet below the top of the Rodessa formation. The sandstones range in color from light red to light gray. They are micaceous, hard to very hard, and range in grain size from very fine to coarse. Some are calcareous and silty, and some are porous, others are not. The shales may be either gray or red. Many are hard, limy, silty, or micaceous. The limestones are finely crystalline to oolitic and non-porous to porous. They are argillaceous, silty, fossiliferous, and may contain lenses of anhydrite. The colors may be light gray, gray, and brownish gray.

Northwood from southern Mississippi, the limestone beds of the Sligo, undifferentiated lower Trinity, and Rodessa become thinner and fewer in number and the sandstones become thicker and more numerous. In the SoSo, Heidelberg, Eucutta, and Yellow Creek fields, no limestones are present and the entire sequence is composed of sandstones and shales. North of these fields, the Sligo formation, undifferentiated lower Trinity, and Rodessa formation of southern Mississippi become lithologically



STRUCTURE MAP
DATUM
BASE FERRY LAKE ANHYDRITE

CONTOUR INTERVAL-1000 FEET

(1) NORTH LIMIT OF DEPOSITION OF FERRY LAKE ANHYDRITE.

(2) ERODED NORTH LIMIT OF FERRY LAKE ANHYDRITE

PLATE 6

similar to the upper Comanche beds and the underlying Hosston of Coahuila age.

In southern Mississippi, the top of the Rodessa is the base of the Ferry Lake anhydrite. The contact of the Sligo, undifferentiated lower Trinity, and Rodessa unit with the Hosston formation is placed below the lowest limestone and above the highest sandstone of the Coahuila series.

The Sligo formation, undifferentiated lower Trinity, and Rodessa formation have a maximum known thickness in Forrest County. In the Superior Oil Company No. 1 Cassie Bradford well, a thickness of 1,252 feet was penetrated between the depths of 14,033 and 15,285 feet.

The regional structural configuration of the top of the Rodessa formation (base Ferry Lake anhydrite, Plate 6) was determined by approximately a dozen wells, nine of which encountered shows of oil or gas in the Sligo formation, undifferentiated lower Trinity, or Rodessa formation. The Gulf Refining Company No. 1 J. W. Bailey well, in the SoSo field, discovered 42.2° API gravity oil in either the Sligo formation or undifferentiated lower Trinity. The Gulf Refining Company No. 1 H. A. Chapman, Sr., was the discovery well of the Chaparral field in Wayne County. This field is productive of 37.8° API gravity oil from the Rodessa and either the lower Trinity or Sligo formation. The Carter Oil Company No. 1 J. L. Wilson well in the Pickens field, Yazoo County, was completed in a sand of either lower Trinity or Sligo age. The Gulf Refining Company No. 1 L. L. Majors well, discovery well of the Ovett field, Jones County, was perforated opposite sands of Rodessa age.

FERRY LAKE ANHYDRITE

The Ferry Lake anhydrite consists of gray shale interbedded with light gray to brownish-gray limestone and anhydrite. Some limestone beds contain fossils and have inclusions of white anhydrite. Other beds are oolitic limestones. The anhydrite is predominantly white and may contain inclusions of limestone.

This formation, in southern Mississippi, is overlain conformably by Mooringsport limestones and shales and is conformably underlain by limestones and shales of the Rodessa formation. To the north, the lithology of the Mooringsport and Rodessa formations changes so that the Ferry Lake anhydrite is below mud-

stones and shales of Mooringsport age and above shales and sands of Rodessa age. The Lower anhydrite stringers of the Rodessa formation, however, persist as far north as Jones County.

In central Mississippi, the white anhydrite, which is the distinguishing characteristic of the Ferry Lake anhydrite, disappears completely (as do the associated limestones) so that the time equivalent of this formation cannot be traced northward.

The maximum known thickness is in Stone County where it is approximately 240 feet. The regional structural configuration of the base of the Ferry Lake anhydrite (Plate 6) is, of course, the counterpart of that of the top of the Rodessa.

Although two wells have encountered shows in this sequence of beds, it is very unlikely that the Ferry Lake anhydrite will ever become an important producing horizon.

MOORINGSPORT FORMATION

In southern Mississippi, the Mooringsport formation is lithologically similar to Mooringsport encountered in numerous wells in Caddo Parish, Louisiana. The section in the Vasen et al No. 1 Fee well between depths of 12,290 and 12,605 feet is illustrative of this sand, shale, and limestone sequence. The sandstones are fine-grained, silty, and micaceous. The shales range in color as follows: dark red, red, light red, gray, and dark gray. They are finely micaceous, limy, and fossiliferous. Some shale beds are flaky and splintery. The limestones are light gray, gray, and brown. They are pseudo-oolitic and fossiliferous.

Northward from the Vasen well, the lithology of the Mooringsport formation changes gradually as illustrated in the sequence found in the Gulf Refining Company No. 1 U.S.A. "W" well in Pearl River County, between the depths of 11,830 and 12,322 feet. In this well it consists of mottled red and gray silty and sandy shale, red and gray shale with plant remains, and carbonaceous material. The limestones are white, gray and tan mottled, and brown. Some limestone beds are finely sucrose, very fine and finely crystalline, glauconitic, fossiliferous, and contain inclusions of calcite and anhydrite.

In the Gulf Refining Company No. 25 J. M. Andrew well in the Baxterville field, Lamar County, Mississippi, the Mooringsport formation contains gray and light gray mudstones and

inclusions of red and gray nodular lime. In the Gulf Refining Company No. 1 J. W. Bailey well in the SoSo field, Jones County, very little limestone is present. The formation consists mainly of mudstones which are various shades of red, gray, ochre, and shales, dark red, finely micaceous. In this well, the Mooringsport formation is only 200 feet thick and contains only one thin bed of light gray, fossiliferous limestone.

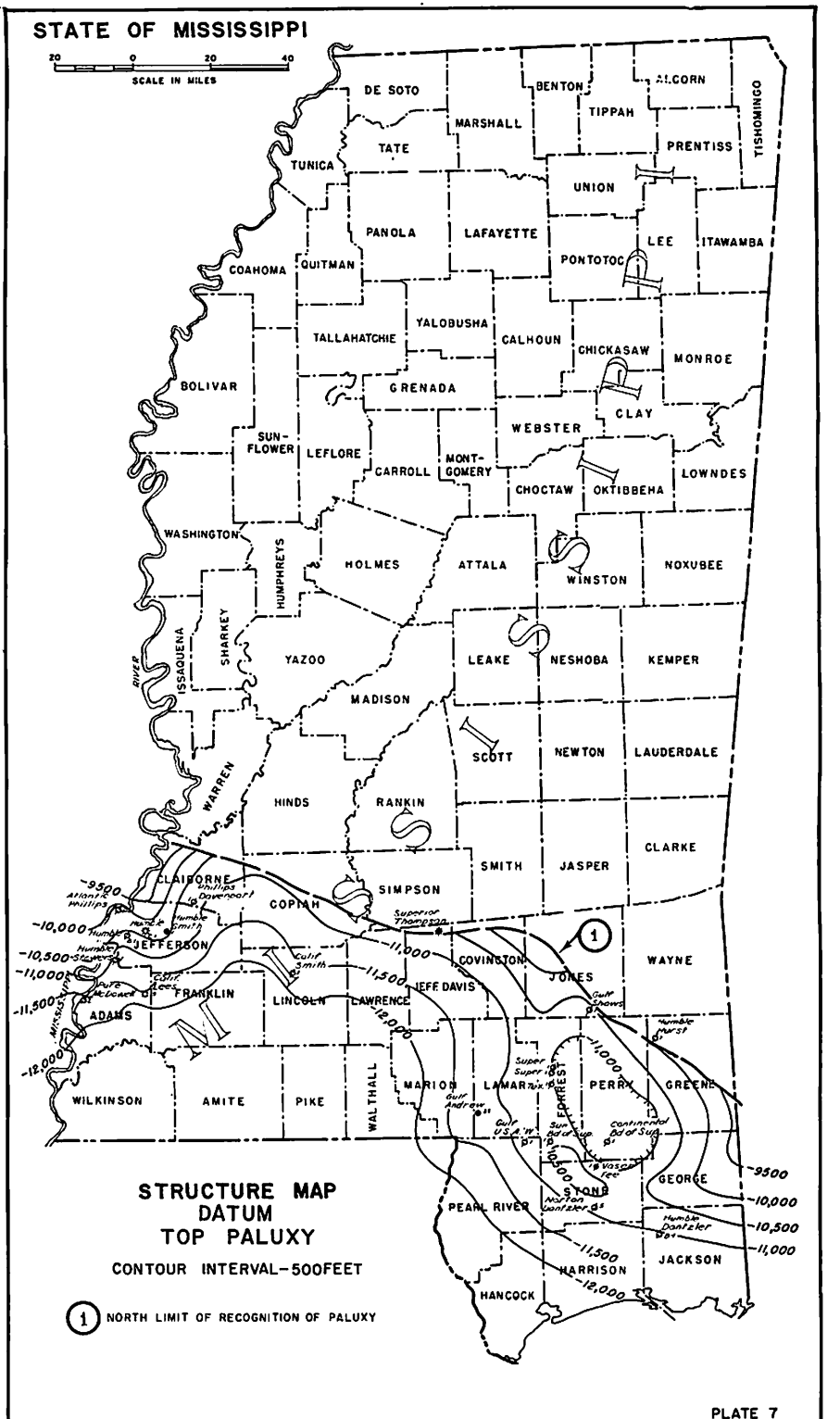
The formation cannot be recognized further north than the Heidelberg, Eucutta, and Yellow Creek fields. The top of the formation in southern Mississippi is placed below the lowest sandstone of the Paluxy formation (Glen Rose age) and above the highest limestone in the Trinity group. The base of the formation is defined as the contact of limestones on the massive anhydrite of the Ferry Lake anhydrite. The upper contact of the Mooringsport formation is transitional with the overlying Paluxy. The basal contact is also transitional. Anhydrite stringers within the basal 150 feet of the Mooringsport of western Mississippi were deposited in waters having abnormal salinity. These stringers are comparable to stringers encountered in the Mooringsport formation of north Louisiana.

From southern Mississippi northward, the limestones of the Mooringsport formation become thinner and fewer in number until this formation can no longer be distinguished from the overlying Paluxy or from the underlying Comanche beds. The greatest known thickness of the Mooringsport formation penetrated by wells in Mississippi is 970 feet, in the Superior Oil Company No. 1 Cassie Bradford well in Forrest County.

The Mooringsport formation has been tested by more than fifteen wells; four of these wells, located in the southeastern part of the state, encountered shows of oil or gas.

PALUXY FORMATION

The Paluxy formation of Mississippi, as discussed in the introduction, is considered to be a sand and shale facies of the upper Trinity. It contains nodular lime and some mudstone beds, but its principal characteristic is an alternating sandstone and shale sequence. Color of sandstones ranges through buff, amber, pink, light red, reddish white, and white. Grain sizes are very fine to coarse; some loose gravels have been noted. The sandstones are porous to nonporous, silty, micaceous (biotitic and muscovitic),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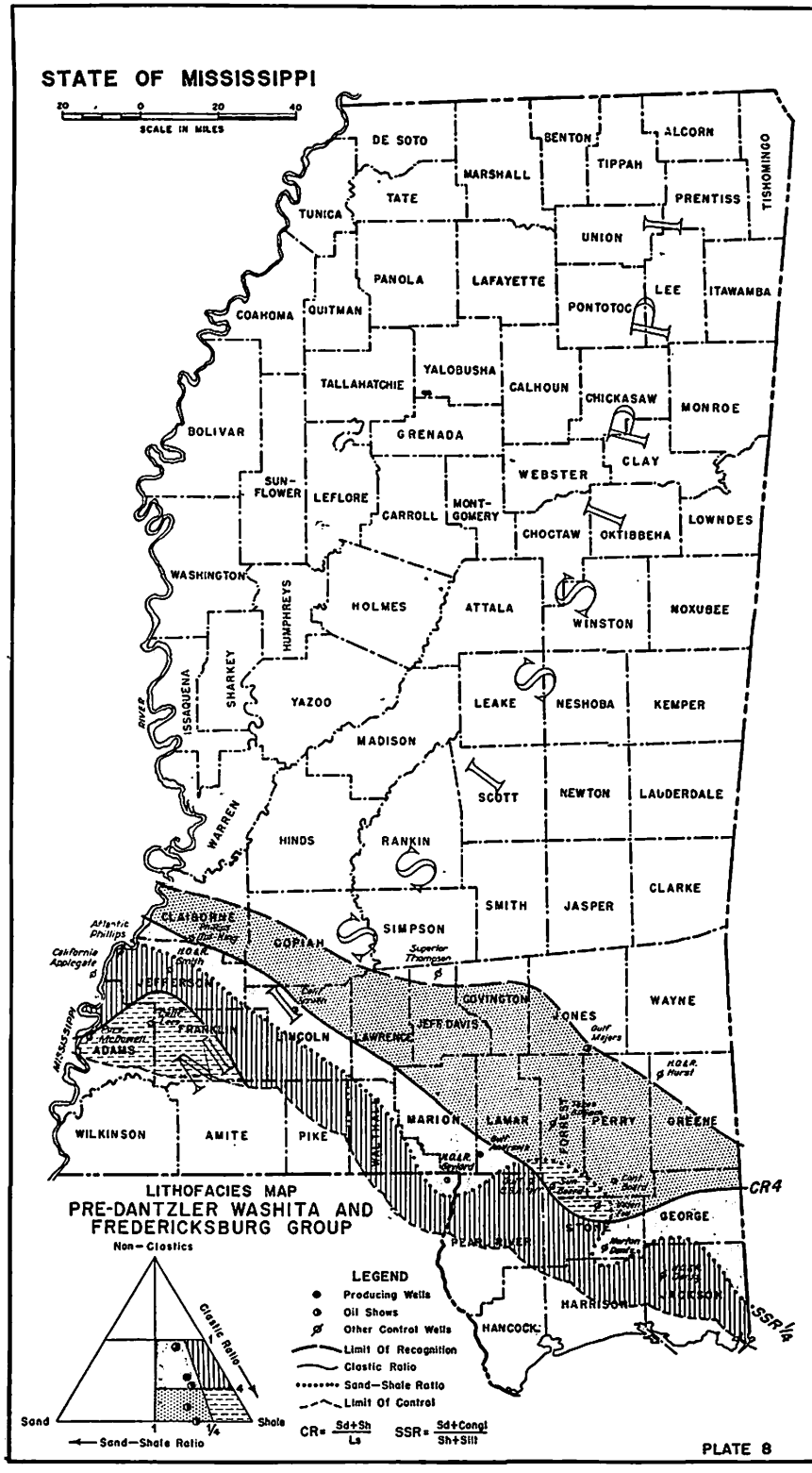
STRUCTURE MAP
DATUM
TOP PALUXY
CONTOUR INTERVAL-500FEET
1 NORTH LIMIT OF RECOGNITION OF PALUXY
PLATE 7

limy, argillaceous, and carbonaceous. The shales are red, maroon, gray, and green; some are mottled, whereas others are black, flaky, and splintery. Some beds contain muscovite and biotite mica. Charaphytes have been noted. Mudstones are green, greenish-gray, gray, ochre, and mottled, and contain lignitic particles.

The top of the formation in most cases is arbitrarily placed at the base of the lowest limestone of the Fredericksburg group. In some cases, the first sand below a shale sequence is considered to be the base of the Paluxy. The base of the formation is defined as the base of the lowest sandstone above the highest limestone of the Mooringsport formation. As described above, the Paluxy formation is recognized most readily in southern Mississippi. It appears to undergo very little change in lithology toward the north. In the central part of the state, it cannot be distinguished from either the Fredericksburg or Mooringsport, because these two sequences of rock units undergo a facies change from limestones to clastics.

The upper contact is believed to be transitional into the overlying Fredericksburg, and the lower contact is clearly transitional. Limestones assigned to the Mooringsport formation in southern Mississippi are the time equivalents of sandstones and shales assigned to the Paluxy formation farther north. The Paluxy-Mooringsport contact transgresses geologic time. In southern Mississippi, the contact is higher stratigraphically than to the north.

The maximum known thickness of the Paluxy formation is 1,448 feet, penetrated in the Superior Oil Company No. 1 Cassie Bradford well, in Forrest County, between the depths of 11,392 and 12,840 feet. The regional structure was mapped on top of the Paluxy (Plate 7). In the area where the Paluxy is recognized, only nine wells have penetrated the complete thickness of these beds. More than twenty wells have penetrated the upper part of the Paluxy formation. Eight of these twenty have encountered shows of oil or gas. Paluxy sands are productive of gas in the Cranfield field. The Gulf Refining Company No. 1 J. W. Bailey well encountered shows in beds believed to be of Paluxy age.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PERRY
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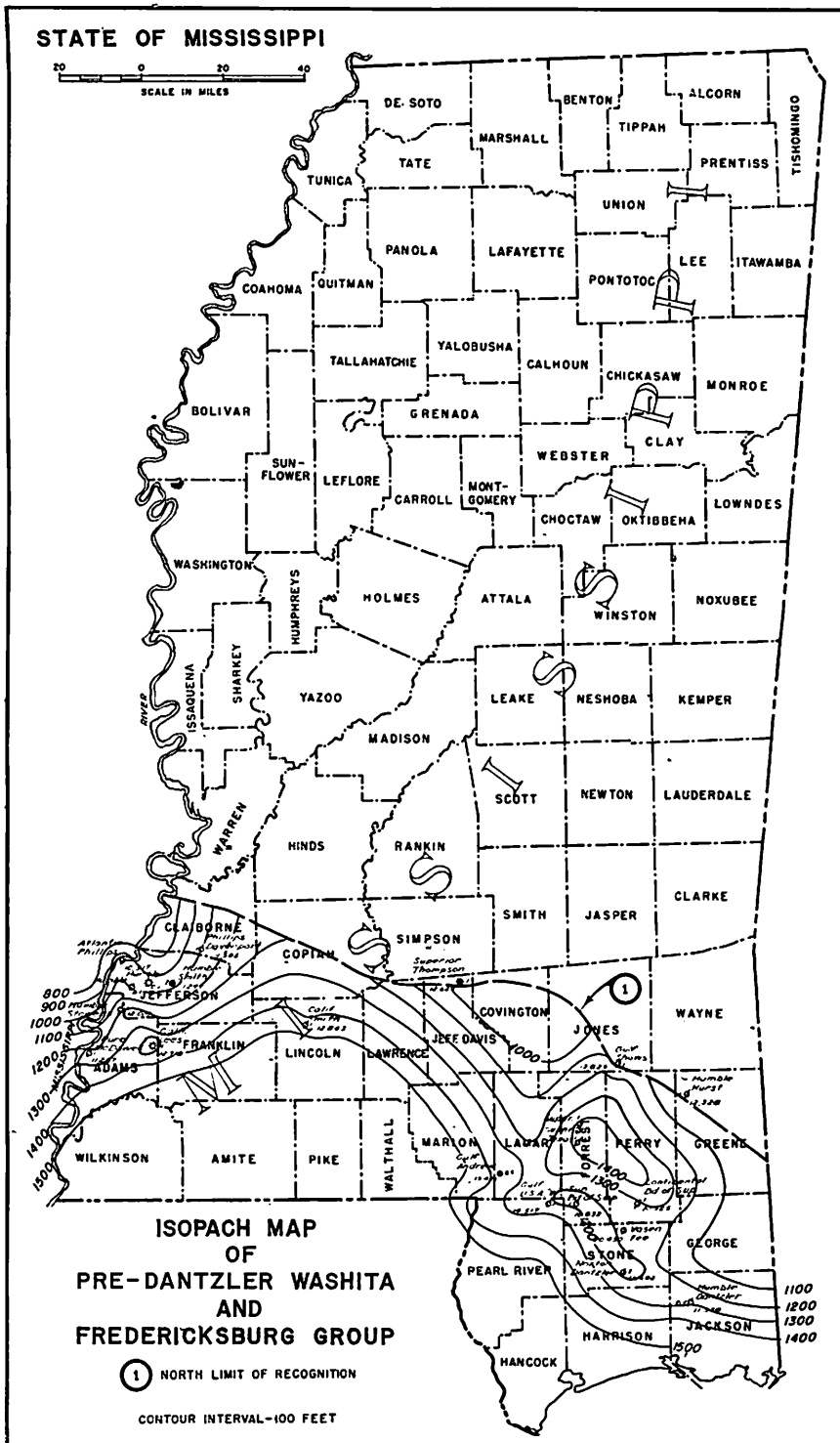
PEARL RIVER
HARRISON
HANCOCK
JACKSON
CR4
SSR1/4
LITHOFACIES MAP
PRE-DANTZLER WASHITA AND
FREDERICKSBURG GROUP
Non-Clastics
Clastic Ratio
Sand
Shale
Sand-Shale Ratio
LEGEND
Producing Wells
Oil Shows
Other Control Wells
Limit Of Recognition
Clastic Ratio
Sand-Shale Ratio
Limit Of Control
CR= Sd+Sh / Ls
SSR= Sd+Congl / Sh+Slt
PLATE 8

PRE-DANTZLER WASHITA AND FREDERICKSBURG GROUPS

The Pre-Dantzler Washita and Fredericksburg groups have not been differentiated, at the present time, in Mississippi. These rocks consist of sand, shale, mudstone, and limestone beds stratigraphically below the Dantzler formation and above the Paluxy facies (Glen Rose) of the upper Trinity. As the Dantzler and Paluxy formations consist of sands and shales, limestone is, therefore, the primary characteristic by which the undifferentiated pre-Dantzler-Washita and Fredericksburg rocks may be recognized. Washita microfauna has been reported in the upper part of this sequence. The limestones are gray, light gray, white, brownish gray, tan, and brown in color. Many beds are fossiliferous, and some are sandy, sucrose, glauconitic, and pseudo-oolitic. The shales are red to dull red, mottled, silty, micaceous, and fossiliferous. Mudstones are gray or greenish-gray, mottled and silty. The sandstones are light red to red, light gray or pale green; many are silty, micaceous, calcareous, fossiliferous (ostracods and lignitized plant remains), and carbonaceous. Their grain sizes range from very fine to medium, and some are porous whereas others are not.

The top of the Washita group is placed at the Lower Tuscaloosa-Dantzler contact. The base of the Dantzler formation is placed between the uppermost Comanche clastic sequence and the highest limestone in the Washita group. The base of the Fredericksburg is placed at the base of the lowest limestone, as noted in the discussion on the Paluxy formation. Limestones are present only in the southern region of Mississippi. Northward, they become thinner and fewer in number and undergo facies changes from carbonates to clastics. In central Mississippi, the pre-Dantzler-Washita and Fredericksburg groups cannot be separated from the underlying Paluxy and the overlying Dantzler beds because of similarity of lithological characteristics.

The lithofacies map of the pre-Dantzler-Washita and Fredericksburg groups of the present existing well data (Plate 8) indicates that the non-clastic component of the pre-Dantzler-Washita and Fredericksburg groups never exceeds 42 percent of the unit. The clastics of the pre-Dantzler-Washita and Fredericksburg groups contain between 2 percent and 45 percent sand. As illustrated the gradual facies change of carbonate rocks to clastics is from south to north.



ISOPACH MAP OF PRE-DANTZLER WASHITA AND FREDERICKSBURG GROUP

(1) NORTH LIMIT OF RECOGNITION

CONTOUR INTERVAL-100 FEET

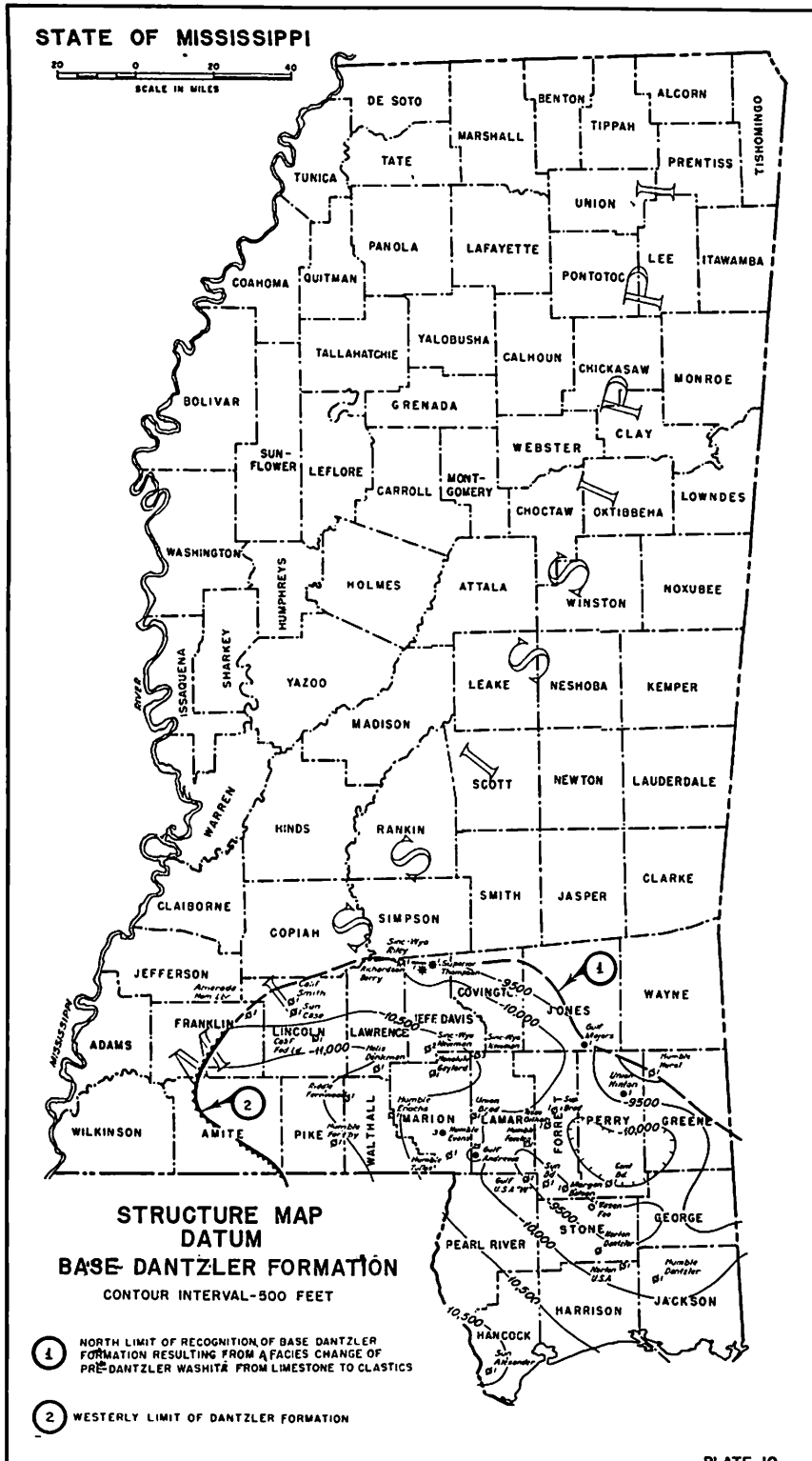
PLATE 9

The thickness variations of the pre-Dantzler-Washita and Fredericksburg groups range from 800 to 1,500 feet in the area of recognition (Plate 9). The Superior Oil Company No. 1 Cassie Bradford well in Forrest County penetrated 1,454 feet of pre-Dantzler-Washita and Fredericksburg rocks between depths of 9,938 feet and 11,392 feet, the maximum known thickness of the unit. The Dantzler formation is transitional with the underlying Washita strata; but in the region where the Dantzler is absent, the Comanche rocks are unconformably overlain by Lower Tuscaloosa conglomeratic sands.

The regional structural configuration of the Comanche series is mapped on the uppermost Washita limestone at the base of the Dantzler formation in the area where the Dantzler is present (Plate 10). In the southern region of Mississippi, where the presence of limestones affords a basis of differentiation of the upper part of the Comanche series, twenty-nine wells have penetrated the entire sequence of the Washita and Fredericksburg groups. Four of these wells encountered oil or gas shows. In the Baxterville field, the Gulf Refining Company No. 25 Andrew well was completed between depths of 10,821 and 10,841 feet opposite a sand of probable Fredericksburg age. Cumulative production as of January 1, 1954, is 4,712 barrels. The Gulf Refining Company No. A-2 Howard well produced 26,239 MCF of gas and 409 barrels of condensate from a Comanche sand of probable Fredericksburg age between the depths of 10,864 and 10,878 feet before it was abandoned in this zone.

DANTZLER FORMATION

The term "Dantzler formation" was originally introduced to designate the stratigraphic unit intervening between the Lower Tuscaloosa gravelly sands and a micro-oolic limestone correlated with the Buda limestone. The Dantzler formation, as defined, is uppermost Comanche in age. The Humble Oil and Refining Company No. B-1 Dantzler well, located in Jackson County, encountered 1,005 feet of Dantzler sediments between the depths of 8,905 and 9,910 feet. The Dantzler formation encountered in this well is the type section. It is correlated with the South Tyler formation of East Texas. The Dantzler formation is a sequence of clastic rocks consisting of alternating sand, mudstone, shale, and siltstone beds. The shales are dark red, dull red, and red and gray mottled in color; they contain mica and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STRUCTURE MAP
DATUM
BASE DANTZLER FORMATION
CONTOUR INTERVAL-500 FEET
1 NORTH LIMIT OF RECOGNITION OF BASE DANTZLER FORMATION RESULTING FROM A FACIES CHANGE OF PRE-DANTZLER WASHITA FROM LIMESTONE TO CLASTICS
2 WESTERLY LIMIT OF DANTZLER FORMATION

PLATE 10

are silty in part. The sandstones are fine to medium-grained, porous to nonporous, and range in color from buff, light green to greenish-white, to dull red. Some sand beds are carbonaceous and lignitic whereas others are calcareous and contain nodules of limestone and clay pellets; some are silty and micaceous. The mudstones vary in color from red to ochre, light green, light gray to gray, and mottled. Nodular limestone may be gray, red, or white.

The formation can be identified only in the southern region of Mississippi; its lithology is rather uniform. The maximum observed thickness of the Dantzler formation is 1,158 feet as penetrated in the Superior Oil Company No. 1 Cassie Bradford well in Forrest County. The regional structural configuration of the base of the Dantzler formation is contoured on the Dantzler-Washita contact (Plate 10).

The Dantzler formation is unconformably overlain by the basal conglomeratic sands of the Lower Tuscaloosa (Gulf Cretaceous). The first dark and dull red, silty, finely micaceous shale, gray and light gray, ochre and mottled mudstone, and red and white nodular limestone mark the eroded top of the Dantzler formation and the top of the Lower Cretaceous.

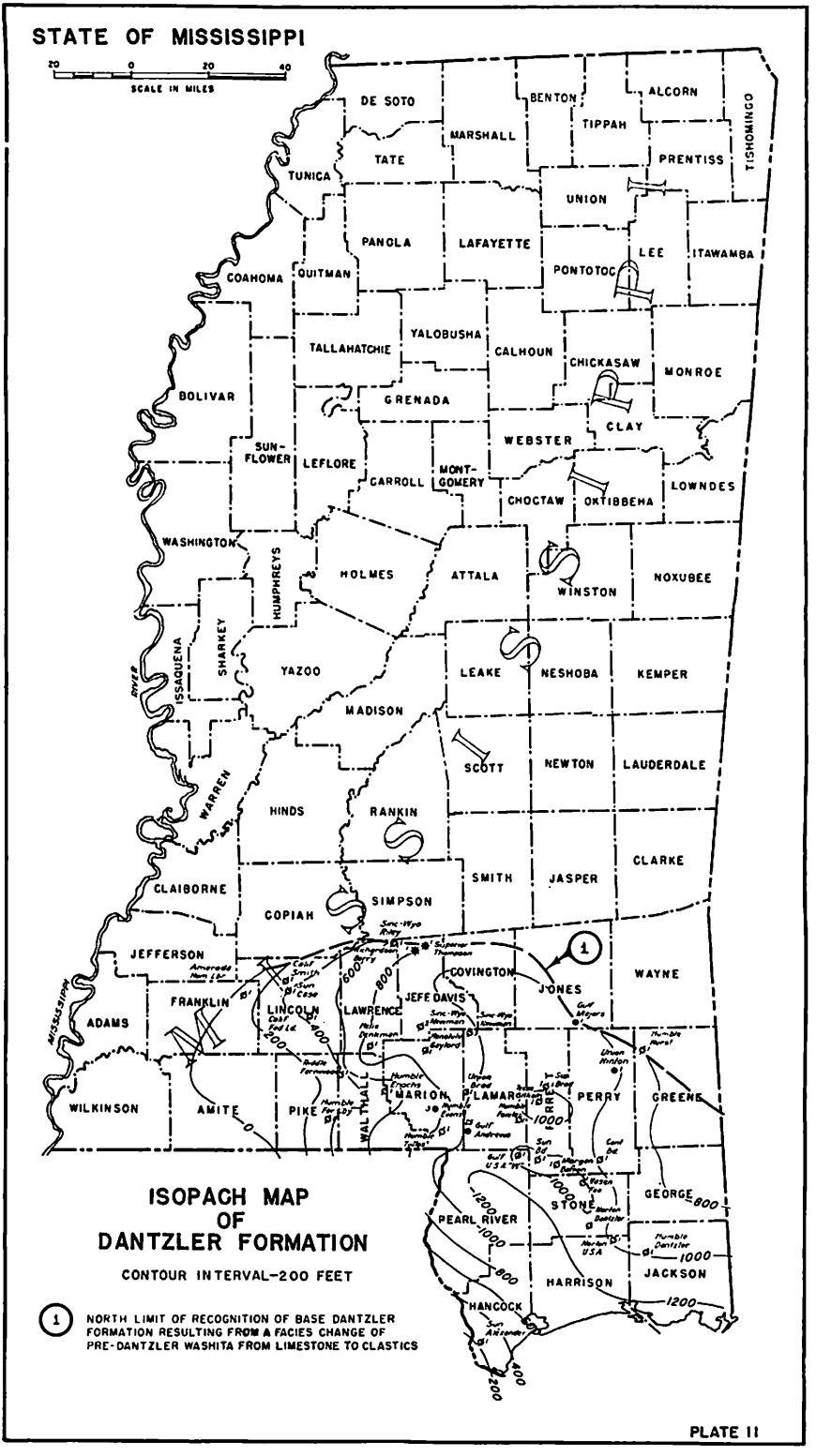
The Dantzler beds are transitional with the Washita limestone section in southern Mississippi and the contact is placed between the lowest sandstone and the highest fossiliferous and micro-oolitic limestone.

The stratigraphic sequence described above is very important in identifying the Dantzler formation which thins toward the north as a result of erosion on its top and possibly by depositional thinning (Plate 11).

In the area where the Dantzler is recognized, approximately fifty wells have penetrated the entire formation. Five encountered shows of oil or gas. The Humble Oil and Refining Company No. 3 E. A. Ball well was the discovery gas well in the Dantzler formation in the Hub field of Marion County.

REGIONAL STRATIGRAPHIC CROSS-SECTIONS

The index map (Plate 12) shows the line of profile of five regional stratigraphic sections. This map also shows the location of the eight fields that have produced from the Lower Cretaceous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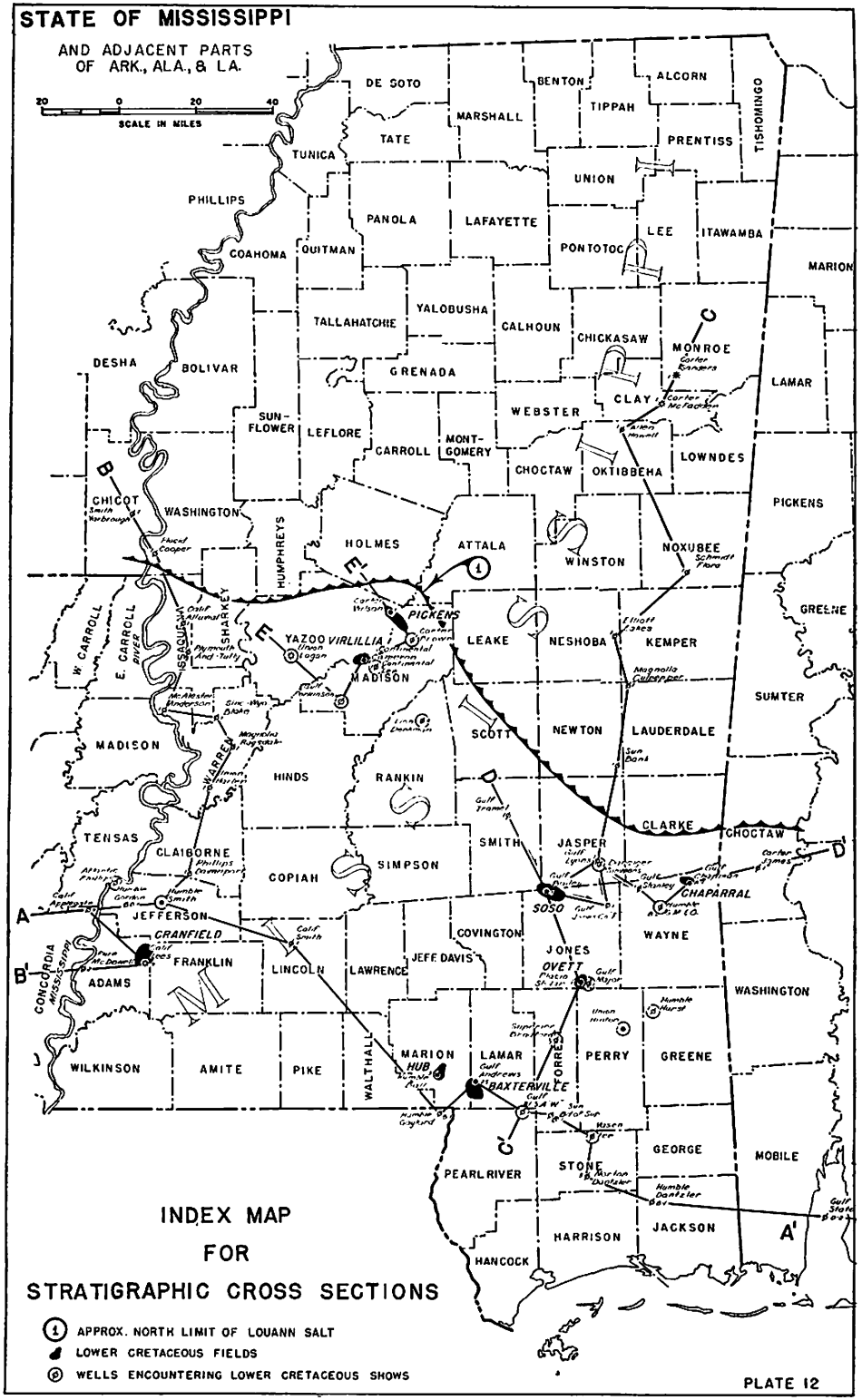
LAMAR
PERRY
GREENE
GEORGE
STONE
PEARL RIVER
HARRISON
JACKSON
HANCOCK
ISOPACH MAP
OF
DANTZLER FORMATION
CONTOUR INTERVAL-200 FEET
1 NORTH LIMIT OF RECOGNITION OF BASE DANTZLER FORMATION RESULTING FROM A FACIES CHANGE OF PRE-DANTZLER WASHITA FROM LIMESTONE TO CLASTICS
PLATE II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INDEX MAP
FOR
STRATIGRAPHIC CROSS SECTIONS
APPROX. NORTH LIMIT OF LOUANN SALT
LOWER CRETACEOUS FIELDS
WELLS ENCOUNTERING LOWER CRETACEOUS SHOWS
PLATE 12

sediments and the location of twenty-two test wells that encountered oil or gas shows in the Lower Cretaceous, as well as the approximate north limit of the Louann salt.

A stratigraphic cross-section A-A[1] from The California Company No. 7 D. V. Applegate well in the Lake St. John field of Concordia Parish, Louisiana, across southern Mississippi to the Gulf Refining Company No. D-2 State of Alabama well, Mobile Bay, Mobile County, Alabama (Plate 13), illustrates the continuity of the Lower Cretaceous sediments in the area of typical development in southern Mississippi.

A north to south stratigraphic cross section B-B[1] from the R. B. Smith and H. Harriman No. 1 C. S. Yarbrough well, in Chicot County, Arkansas, through the western tier of counties of Mississippi to the Pure Oil Company No. 2 J. M. McDowell well in the Carthage Point field of Adams County, Mississippi (Plate 14), illustrates three points of interest. First, it is apparent that the Washita and Fredericksburg groups undergo facies changes from carbonate and clastic rocks to all clastics from south to north (from Adams County to Warren County). Second, in the area of the Monroe Uplift, the entire Lower Cretaceous sequence is truncated and the Gulf Cretaceous comes to rest unconformably on Upper Jurassic. Third, the Navarro chalk was deposited on the truncated surface of the Tuscaloosa, Eagle Ford, Austin, and Taylor beds.

A line of stratigraphic cross-sections C-C[1] from the Carter Oil Company No. 1 J. T. Sanders well, in the Muldon field in Monroe County, to the Gulf Refining Company No. 1 U.S.A. well in Pearl River County (Plate 15), traverses the state from north to south.

The pre-Dantzler-Washita and Fredericksburg group, as a unit, in the southernmost well on the section, is a typical limestone and shale sequence with a minor amount of sand. Northward, the clastics increase to such an extent that the unit cannot be differentiated from the overlying Dantzler beds nor the underlying Paluxy beds. The Gulf Refining Company No. 1 R. Lyons well in the Heidelberg field shows the facies of the northern area.

There is no apparent change in the lithology of the Paluxy from south to north. The section suggests the possibility of an expansion of the Paluxy facies at the expense of the underlying

Mooringsport formation. Indications are that the Mooringsport formation undergoes facies change from limestones and shales to an all clastic sequence from south to north.

The Ferry Lake anhydrite thins to the north. It is present in the Gulf Refining Company No. 1 J. W. Bailey well in Jones County and is absent in the Heidelberg field, 15 miles to the northeast, in Jasper County.

The Sligo, undifferentiated lower Trinity, and Rodessa change facies from south to north and lose their identities.

The sands of the Hosston formation become more coarse and gravelly to the north. Beyond the Magnolia Petroleum Company No. 1 C. Culpepper well, in Lauderdale County, the Coahuila beds are probably overlapped by Comanche beds.

North of the Heidelberg field, Lower Cretaceous beds were deposited on the truncated surface of Cotton Valley, Smackover, and Paleozoic rocks. The Lower Cretaceous has in turn been truncated and Gulf Cretaceous beds were deposited on the beveled surface of the Lower Cretaceous and Paleozoic.

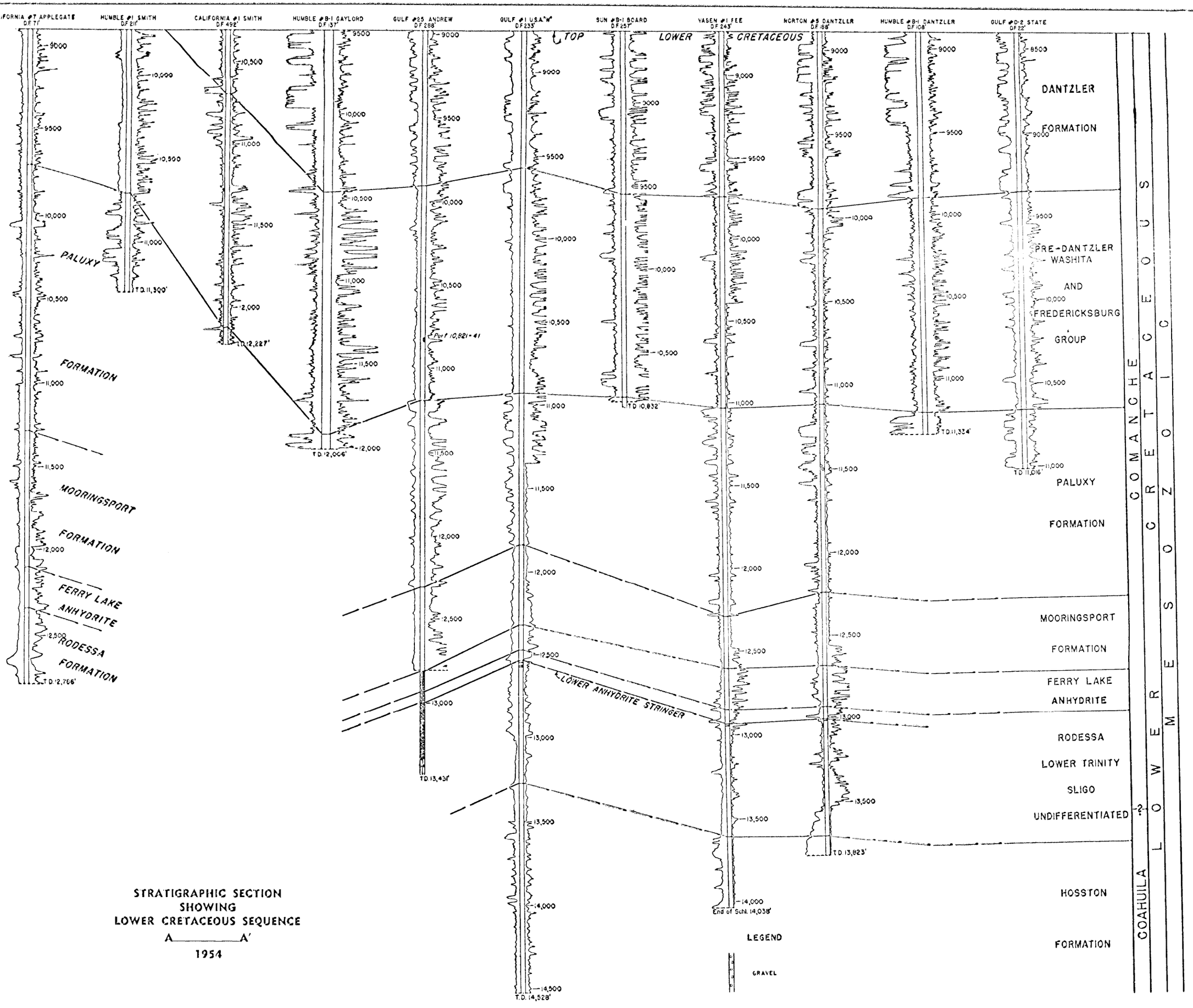
A stratigraphic cross-section D-D^1 from the Gulf Refining Company No. 1 Lois Tramel wildcat well in Smith County, south to the SoSo field, thence easterly through the Gulf Refining Company No. 1 Jones County "F" well, through the Heidelberg, Eucutta, Yellow Creek, and Chaparral fields, to the Gilbertown field in Alabama (Plate 16), traverses the area where the Lower Cretaceous is predominantly clastics. Correlation of formations and groups is most difficult if not impossible. The Ferry Lake anhydrite loses its identity between the Gulf Refining Company No. 1 Jones County "F" well and the Heidelberg field. Easterly, it loses its identity between the No. 1 Jones County "F" well and the Eucutta field, in Wayne County. In eastern Wayne County, Chaparral field area, the all-clastic Trinity is not differentiated.

A stratigraphic cross-section E-E^1 from the Tinsley field, in Yazoo County, southeasterly to the Gulf Refining Company No. 1 S. G. Parkinson well in Madison County, thence northeasterly to the Virlillia field, thence to the Carter Oil Company No. 1 S. L. Brown, and thence northwesterly to the Pickens field in Yazoo County (Plate 17), illustrates the stratigraphic position

TABLE I

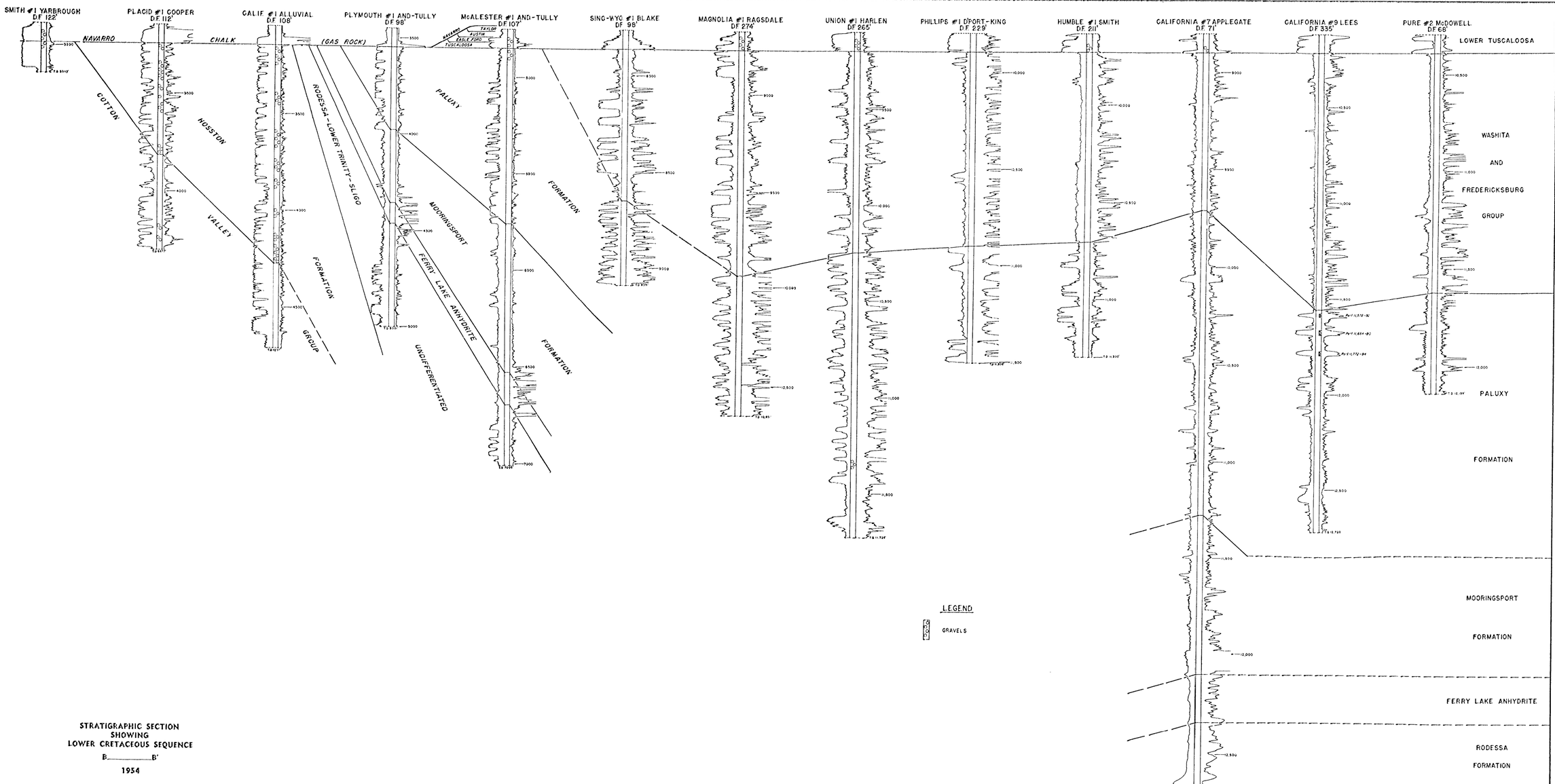
LOWER CRETACEOUS OIL, GAS, AND CONDENSATE FIELDS

Field	County	Year of Discovery	Producing Zone	Depth of Producing Zone	Gravity °API	Estimated Productive Area-Acres	Production			
							Oil in Barrels	Gas in MMCF	Cond. in Bbls.	Prod. as of
Baxterville	Lamar & Marion	1952	Fredericksburg	10,821	40.9	40	4,712	1	0	1-1-54
Chaparral	Wayne	1952	Rodessa	8,954						
			L. Trinity or Sligo	9,485	39.5	500	131,251	7	0	1-1-54
Cranfield	Adams & Franklin	1946	Paluxy	11,578	....	1,000	0	9,746	0	1-1-54
Hub	Marion	1946	Dantzler	10,098	53	320	0	253	7,127 (Well shut in)	4-1-49
Ovett	Jones	1948	Paluxy	12,011						
			Mooringsport	12,537	31.2	40	65,004	15	0	12-1-52
			Rodessa (?)	12,880					(Re-completed in Gulf Cretaceous)	
Pickens	Yazoo & Madison	1950	L. Trinity or Sligo	7,728	42.3	40	9,097	1	0 (Temporarily abandoned)	1-1-52
SoSo	Jones, Jasper & Smith	1953	L. Trinity or Sligo	11,966	42.2	.....	20,615	8	....	1-1-54
Virlillia	Madison	1951	Hosston	10,559	38.9	40	26,228	6	0	1-1-54

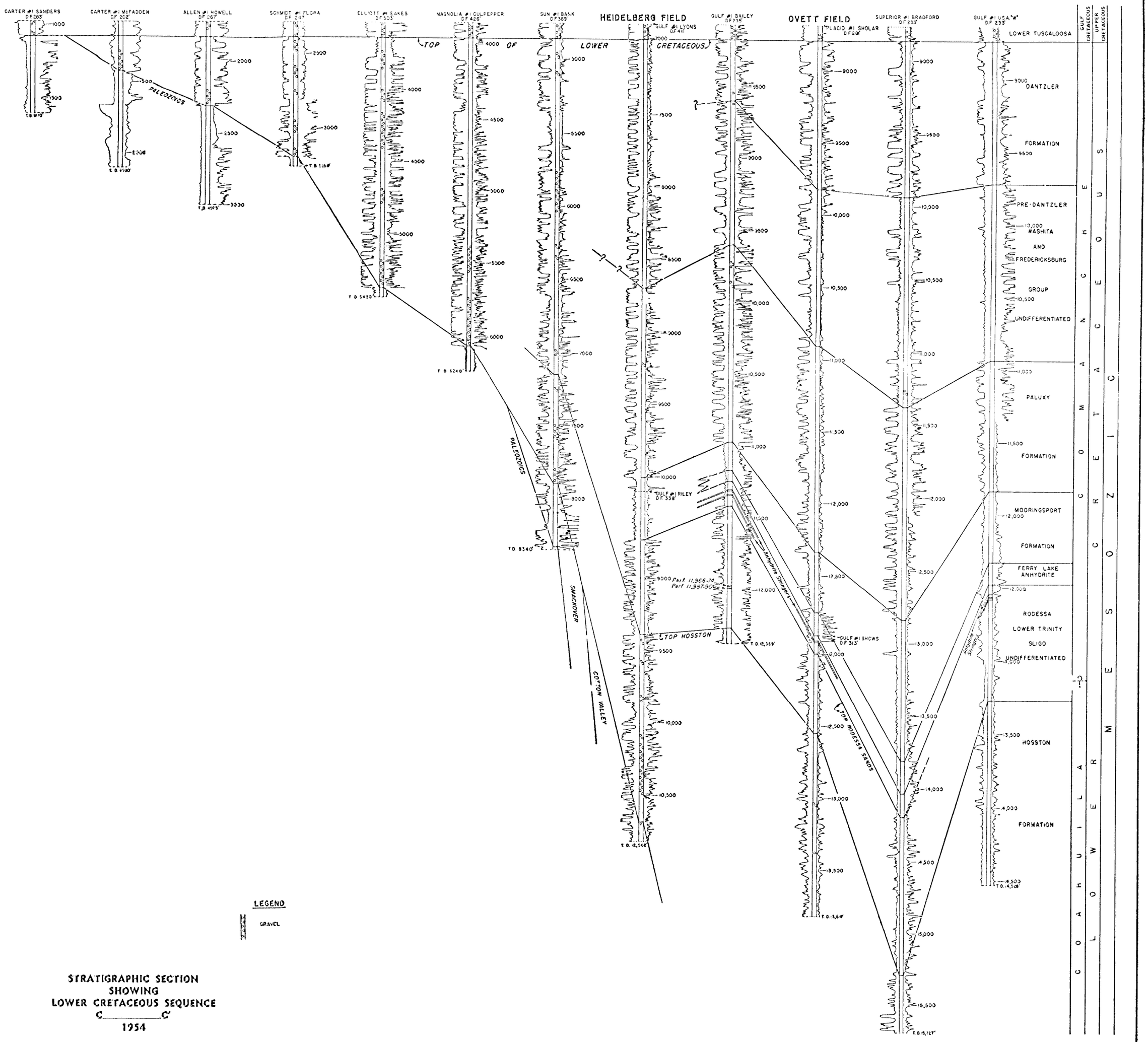


STRATIGRAPHIC SECTION
SHOWING
LOWER CRETACEOUS SEQUENCE
A——————A'
1954

LEGEND
GRAVEL



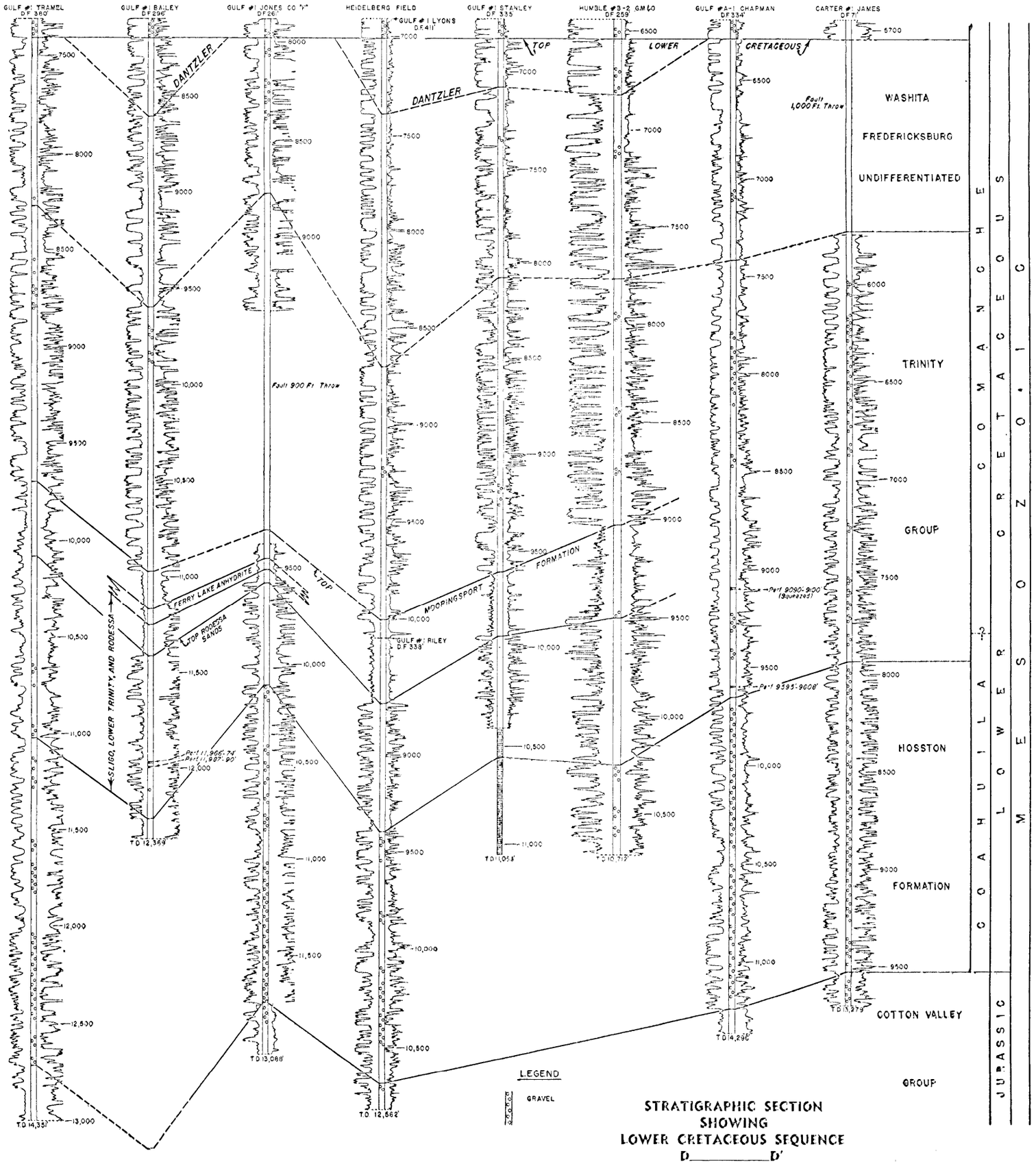
STRATIGRAPHIC SECTION
SHOWING
LOWER CRETACEOUS SEQUENCE
B——————B'
1954



LEGEND

GRAVEL

**STRATIGRAPHIC SECTION
SHOWING
LOWER CRETACEOUS SEQUENCE
C_____C'
1954**


GULF #1 TRAMEL DF 380'
GULF #1 BAILEY DF 296'
GULF #1 JONES CO "A" DF 261'
HEIDELBERG FIELD
GULF #1 LYONS DF 411'
GULF #1 STANLEY DF 335'
HUMBLE #B-2 GM&O DF 259'
GULF #A-1 CHAPMAN DF 334'
CARTER #1 JAMES DF 71'
DANTZLER
DANTZLER
TOP
LOWER CRETACEOUS
Fault 4,000 Ft. Throw
Fault 900 Ft Throw
TERRY LAKE ANHYDRITE
TOP RODESSA SANDS
SLIGO, LOWER TRINITY, AND RODESSA
TOP
MOORINGSPORT FORMATION
GULF #1 RILEY DF 338'
Perf 11,966'-74'
Perf 11,987'-90'
Perf 9090'-9100' (Squeezed)
Perf 9395'-9608'
TD 12,369'
TD 13,088'
TD 11,054'
TD 10,719'
TD 14,296'
TD 13,279'
TD 14,351'
TD 12,562'
WASHITA
FREDERICKSBURG
UNDIFFERENTIATED
TRINITY
GROUP
HOSSTON
FORMATION
COTTON VALLEY
GROUP
COAHUILA
LOWER CRETACEOUS
MESOZOIC
JURASSIC
LEGEND
GRAVEL
STRATIGRAPHIC SECTION
SHOWING
LOWER CRETACEOUS SEQUENCE
D_____D'
1954

UNION #1 LOGAN
D. F. 250'

GULF #1 PARKINSON
D. F. 258'

CONTINENTAL #1 CAMERON ET AL
D. F. 198'

CARTER #1 BROWN
D. F. 262'

CARTER #1 WILSON
D. F. 240'

LOWER TUSCALOOSA

TOP LOWER CRETACEOUS

UNDIFFERENTIATED

COMANCHE CRETACEOUS

HOSSTON FORMATION

COTTON VALLEY GROUP

WILSON SAND ZONE

VIRLILLIA SAND ZONE

COTTON VALLEY

Perf 7728-37

Perf 10,559-63

T D 14,427'

T D 11,717'

T D 14,258'

T D 12,494'

T D 12,250'

GULF CRETACEOUS
UPPER CRETACEOUS

COMANCHE

CRETACEOUS

COAHUILA

LOWER

MESOZOIC

JURASSIC

LEGEND

GRAVEL

STRATIGRAPHIC SECTION
SHOWING
LOWER CRETACEOUS SEQUENCE
E _____ E'
1954

GULF #1 CROW D.F. 299'

GULF #A-1 CHAPMAN U. D.F. 305'

GULF #1 JONES UNIT D.F. 326'

GULF #A-1 CHAP JONES U. D.F. 364'

GULF #1 CHAP-JONES U D.F. 281'

GULF #A-1 CHAPMAN, Sr. D.F. 334'

TOP LOWER CRETACEOUS

LOWER TUSCALOOSA

UNDIFFERENTIATED

COMANCHE

CRETACEOUS

CHAPARRAL PRODUCING ZONES

HOSSTON FORMATION

COTTON VALLEY GROUP

Zone with oil shows

1st Producing Zone

2nd Producing Zone

3rd Producing Zone

4th Producing Zone

T.D. 9716'

T.D. 9713'

T.D. 9715'

T.D. 9726'

T.D. 9711'

T.D. 14,276'

GULF CRETACEOUS

UPPER CRETACEOUS

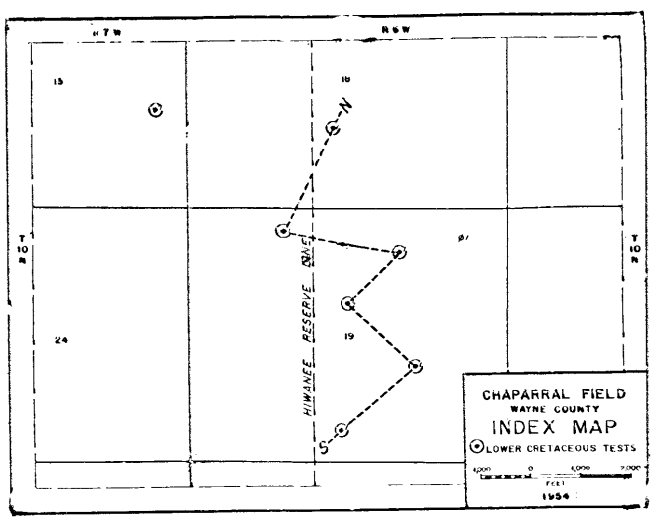
COMANCHE CRETACEOUS

LOWER CRETACEOUS

JURASSIC

COAHUILA

?



CHAPPARRAL FIELD
WAYNE COUNTY
STRATIGRAPHIC SECTION
SHOWING
LOWER CRETACEOUS SEQUENCE
N - - - - - - - S
1954

TABLE II

TYPICAL PHYSICAL PROPERTIES OF CRETACEOUS RESERVOIR ROCK

Field	Porosity % θ	Permeability Md H	Permeability Md V	Residual Saturation[1] % Pore Space Oil %	Residual Saturation[1] % Pore Space Water %	Formation Factor[2] F	Cementation Factor[3] m	Capillary Pressure[4] Water Saturation	Residual Gas Saturation by Imbibition[5]	Lithology
Baxterville	16.1	42	23	21	32					Sd hd gr f to m
Chaparral	21.0	428		21	53			14-20	38.4	Sd gr to br hd f to m
Cranfield	12.0	8		0	42					Ss gr hd tite f to m mic cal
Hub	18.4		41	5.25	34.2					Sd lt gr hd f mic f
Ovett	9.1	3.28	26	70	70					Ss lt gr hd tite f to m cal mic w/some blk sds
Pickens	21.4	210	195							Sd wh to lt gr f to m sli mic
SoSo	15.6	200	200	14	52	28.9	1.72	20.0	43.5	Ss lt gr to br hd f to m mic clean to argil
Virillia	19.0	1000		30	61					Ss m small qtz grav & chips

[1] By retort method

[2] Formation factor $= \frac{\text{Resistivity of core 100\% saturated with water}}{\text{Resistivity of water}}$

[3] $F = \theta^{-m}$ where θ = Porosity

[4] Air-brine desaturation method using capillary pressure of 45 psi

[5] May be equivalent of flood pot residual

of the Wilson sand zone of the Pickens field and the Virlillia sand zone of the Virlillia field. Present correlations are suggestive of either a lower Trinity or Sligo age for the Wilson sand zone and lower Hosston age for the Virlillia sand zone. The conglomeratic development of Hosston sands is very apparent in this area. The Comanche Cretaceous is not differentiated in the area because of the similarity of the sediments.

OIL AND GAS PRODUCTION

Eight fields in Mississippi produce or have produced oil or gas from Lower Cretaceous rocks; a total of 256,907 barrels of oil and 10,037 MMCF of gas has been produced (Table I). Typical physical properties of the Lower Cretaceous reservoir rocks are presented in tabular form (Table II).

VIRLILLIA FIELD

The oldest producing Lower Cretaceous formation in Mississippi is the Hosston. The discovery well of the Virlillia field, the Continental Oil Company No. 1 J. R. Cameron, in Madison County, was completed July 18, 1951. The well flowed 209 barrels of 38.9° API gravity oil and 78 barrels of salt water daily through a 12/64 inch top choke through perforations between depths of 10,559 and 10,563 feet, opposite basal Hosston conglomeratic sands.

The reservoir rock is a medium-grained, porous sandstone with abundant small gravels and chert chips. No core analysis data are available of this section. However, core analysis data of a similar section, approximately 100 feet lower in the Hosston, had an average porosity of 19 percent, average permeability of 1000 millidarcies, residual oil saturation of 30 percent, and water saturation of 61 percent. The stratigraphic position of this reservoir rock may be seen on Plate 17.

Little is known of the structure of this field. To date, only one other well has been drilled and this well was dry and abandoned. The Continental Oil Company No. 1 J. B. Lee well, located approximately 2½ miles southeast of the discovery well, encountered noncommercial shows in the Hosston. Cumulative production as of January 1, 1954, was as follows: 26,228 barrels of oil, 6,269 MCF gas, and 114,980 barrels of water.

To date, this is the only field in Mississippi producing from the Hosston formation. Other wells that penetrated the Hosston formation and encountered shows are listed on Table III.

Table III

Partial List of Oil and Gas Shows in Lower Cretaceous of Mississippi

Wildcats and Discovery Wells

County	Well Name	Location	Formation and Depth of Shows						
			Dantzler	Pre-Dantzler Washita and Fredericksburg	Paluxy	Mooringsport	Ferry Lake Anhydrite	Rodessa, Lower Trinity & Sligo	Hosston Undifferentiated
Adams	California No. 9 Ella G. Lees	Sec. 45-7N-1W			11,772-794* 11,906-926 12,541-564 11,664-690* 11,578-592*				
Forrest	Superior No. 1 Cassie Bradford	Sec. 1-3N-13W		11,210-225	12,055-061 12,390-410 12,468-490	13,323-329 13,398-403 13,443-447			
Greene	Humble No. 1 J. A. Hurst	Sec. 33-5N-8W						11,978-989	
Jasper	Danciger No. 1 C. J. Simmons	Sec. 36-1N-12E						8,732-9,340	
Jefferson	Atlantic No. 1 H. A. Phillips	Sec. 10-10N-2W		9,554-9,558					
	Humble No. C-1 M. R. Smith	Sec. 27-9N-1W			10,930-940				
Jones	Gulf No. 1 L. L. Majors	Sec. 29-6N-11W	9,724	10,028 10,031 10,033	11,223-313 11,546-597 11,870-890 12,010-290*	12,290-376* 12,537-557* 12,675-690*	12,762-807	12,878-13,083* 13,127-152	
	Gulf No. 1 J. W. Bailey	Sec. 27-10N-13W			9,710-712			11,370-374 11,421-477 11,966-990* 12,113-122	
Lamar	Gulf No. 25 J. M. Andrew	Sec. 6-1N-16W	8,987-9,037 9,290-297 9,536-541 9,552 9,714 9,770	10,124-162 10,228 10,532 10,537-870*	11,202 11,208 11,312-347 11,579-592 11,606-609 12,010	12,477-573	12,907-930	12,930-13,332	

TABLE III (CONT'D.)

County	Well Name	Location	Formation and Depth of Shows						
			Dantzler	Pre-Dantzler Washita and Fredericksburg	Paluxy	Moorings-port	Ferry Lake Anhydrite	Rodessa, Lower Trinity & Sligo	Hosston	Undifferen-tiated
	Gulf-Welch No. A-2 W. J. Howard	Sec. 17-1N-16W		10,864-878*						
Madison	Continental No. 1 J. R. Cameron	Sec. 36-10N-1E							10,559-563 10,679-699	
	Continental No. 1 J. B. Lee	Sec. 4-9N-2E							10,885-929	7,702-719
	Gulf No. 1 Samuel G. Parkinson	Sec. 23-9N-1W								9,533-535 10,033-043
	Carter No. 1 S. L. Brown	Sec. 31-11N-4E								6,323-333 6,844-882
Marion	Humble No. 3 E. A. Ball	Sec. 20-2N-14E	9,936-938 10,098-106*							
Pearl River	Gulf No. 1 U. S. A. "W"	Sec. 8-1S-14W	9,469-476 9,512-551		10,944-952 11,289-301 11,438-483	12,033-103 12,144-233		12,951-13,001	13,318-431 13,541-591	
Perry	Union No. 1 S. F. Hinton	Sec. 30-4N-9W	9,604-608 9,624							
Rankin	Lion No. 2 Denkman	Sec. 22-7N-4E							11,169-198 11,531-541 11,547-552 11,593-599	
Stone	George Vasen No. 1 Fee	Sec. 9-2S-11W							13,620-655	
Washington	Murphy-Sun No. 1 M. A. Treadway	Sec. 20-15N-6W							3,808-814	
Wayne	Gulf No. A-1 H. A. Chapman, Sr.	Sec. 19-10N-6W						9,090-106 9,595-608*		
	Humble No. B-2 G.M. & O. Land Co.	Sec. 24-9N-8W						9,620-628		
Yazoo	Carter No. 1 J. L. Wilson	Sec. 30-12N-3E						7,732-766* 7,824-827 7,870-872	8,866	
	Union No. 1 Logan	Sec. 23-10N-3W								9,836-844

*Note: Well completed as producer within interval shown

CHAPARRAL FIELD

The Chaparral field of Wayne County produces from two general horizons. The upper is Trinity sands which are probably stratigraphically below the Ferry Lake anhydrite. The lower is either lower Trinity or Sligo in age. The stratigraphic position of the Chaparral producing zones is shown on Plate 18. The Gulf Refining Company No. 1 H. A. Chapman, Sr., discovery well of the field, was perforated between the depths of 9,595 and 9,608 feet. On initial test, the well flowed 317 barrels of 39.5° API gravity oil through 10/64 inch top choke with 20 percent basic sediments and water. This zone, lowest producing horizon in the field to date, is stratigraphically immediately above the top of the Hosston. This is the normal position of the Sligo formation. Inasmuch as it is a sand and shale facies, it cannot be definitely recognized as Sligo in age. This well had shows in sands (which are probably Rodessa in age) approximately 450 feet higher in the section.

The reservoir is a series of lenticular sands through an interval of approximately 650 feet. The sands are gray to brown, fine to medium grain, micaceous, hard, and porous. Clay balls are often present. Some sands are very limy. Average porosity is 21 percent; average permeability is 428 millidarcies; average oil saturation is 21 percent; and average water saturation is 53 percent.

A total of seven wells have been drilled to date in the Chaparral field, six of which have been completed in one or another of the four producing zones of the field. One well, the Gulf Refining Company No. 1 Chapman-Smith Unit, was dry in the Lower Cretaceous but was completed in an Upper Cretaceous sand. Cumulative production of the field as of January 1, 1954, was 131,251 barrels of oil.

PICKENS FIELD

The discovery of Lower Cretaceous oil in the Pickens field was made in the Carter Oil Company No. 1 J. L. Wilson well. This well was completed February 14, 1950, flowing 179 barrels of 42.3° API gravity oil per day through perforations between depths of 7,728 feet and 7,737 feet opposite a sand of either lower Trinity or Sligo age.

The reservoir rock is a white to light gray and pink, very fine to medium-grained, silty, slightly micaceous sandstone. Table II lists typical reservoir properties. Plate 19 is a southwest-northeast cross-section showing the stratigraphic position of the Wilson sand. This cross-section indicates the Wilson sand is not developed in the updip well.

The Pickens field is a faulted structure (Plate 20). The datum of this structural contour map is the top of the Wilson sand or its equivalent. The accumulation in the Gulf Cretaceous reservoir is a direct result of faulting which produced closure. The Wilson sand accumulation, though associated with this structure, is primarily stratigraphic. Eight wells have been drilled on the Pickens structure in search of Wilson sand production. Of these eight wells, only the discovery well was productive. The cumulative production from this well is 9,097 barrels of oil. It is now temporarily abandoned.

OVETT FIELD

The first Lower Cretaceous oil in Mississippi was discovered by the Gulf Refining Company No. 1 L. L. Majors well. This well, in the Ovett field in Jones County, was completed January 5, 1948, pumping 195 barrels of 31.2° API gravity oil plus 2 percent basic sediment and water. The casing was perforated opposite sands of three different formations. Perforations were opposite a zone from 12,880 feet to 13,082 feet in the Rodessa and lower Trinity, opposite a zone from 12,537 feet to 12,688 feet in the Mooringsport formation, and opposite a zone from 12,011 feet to 12,288 feet in the Paluxy formation.

The Rodessa and lower Trinity reservoir is a series of sands with alternating shales and a few thin beds of limestones. The sandstones are soft to hard, brown to black, fine to medium-grained, slightly lignitic, slightly ashy, slightly glauconitic, slightly calcareous, partly quartzitic, slightly porous to porous, becoming shaly in part.

The Mooringsport reservoir rock is a few thin beds of firm to hard, tight to slightly porous, fine to medium-grained, very calcareous sandstone with intervening thin beds of sandy limestone and carbonaceous shales.

The Paluxy sands are predominantly light gray to pale green, hard, tight, fine-grained, limy, and very micaceous. Some sands are brown, medium to coarse-grained, and very bentonitic.

The Ovett field is a complexly faulted penetration dome (Plate 21). Typical of the salt dome basin structures, Ovett has a central graben system. A west to east stratigraphic cross-section illustrates the difficulties of correlations and structural interpretations (Plate 22).

The L. L. Majors well had an accumulated production of 65,004 barrels of oil and 15 MMCF of gas on December 1, 1952, when it was recompleted in a Gulf Cretaceous sand. Three other wells drilled to the Lower Cretaceous were dry and abandoned.

SOSO FIELD

Probably the most significant Lower Cretaceous discovery in Mississippi is the new pool discovery, in the SoSo field, by Gulf Refining Company. The SoSo field, in Jasper, Jones, and Smith Counties, is a multi-reservoir gas field discovered by the Gulf Refining Company No. 1 Edwards-Bailey Unit well, March 1, 1945. This field is productive of gas and condensate from Gulf Cretaceous beds. The new pool discovery, the Gulf Refining Company No. 1 J. W. Bailey well, was completed August 2, 1953, flowing 195 barrels of 42.2° API gravity oil. The well was perforated from a depth of 11,966 feet to a depth of 11,974 feet and from a depth of 11,987 feet to a depth of 11,990 feet opposite sands that are believed to be either lower Trinity or Sligo in age. This oil column is approximately 54 feet thick. A drill stem test of a Rodessa sand, between depths of 11,425 and 11,435 feet, indicated it also will be productive of high gravity oil. This oil column is approximately 45 feet thick. Additional shows were found in sidewall samples taken at depths 9,710 feet and 9,712 feet in a sand of the Paluxy formation.

The producing sand in the J. W. Bailey well is hard, fine to medium-grained, gray and light tan to brown, silty, micaceous, and porous. The Rodessa sand is hard, very fine to medium-grained, gray to brown, and pale green, silty, micaceous, lignitic, slightly calcareous, and argillaceous with clay balls. Table II gives other pertinent information on the reservoir.

The SoSo structure is an east-west trending anticline having gentle plunge and flank dips. A stratigraphic cross-section shows the characteristics of the Lower Cretaceous sediments, the sequence of beds, and the stratigraphic position of the producing horizon (Plate 23).

Full significance of the Lower Cretaceous discovery at SoSo cannot be ascertained until additional development wells have been completed.

CRANFIELD FIELD

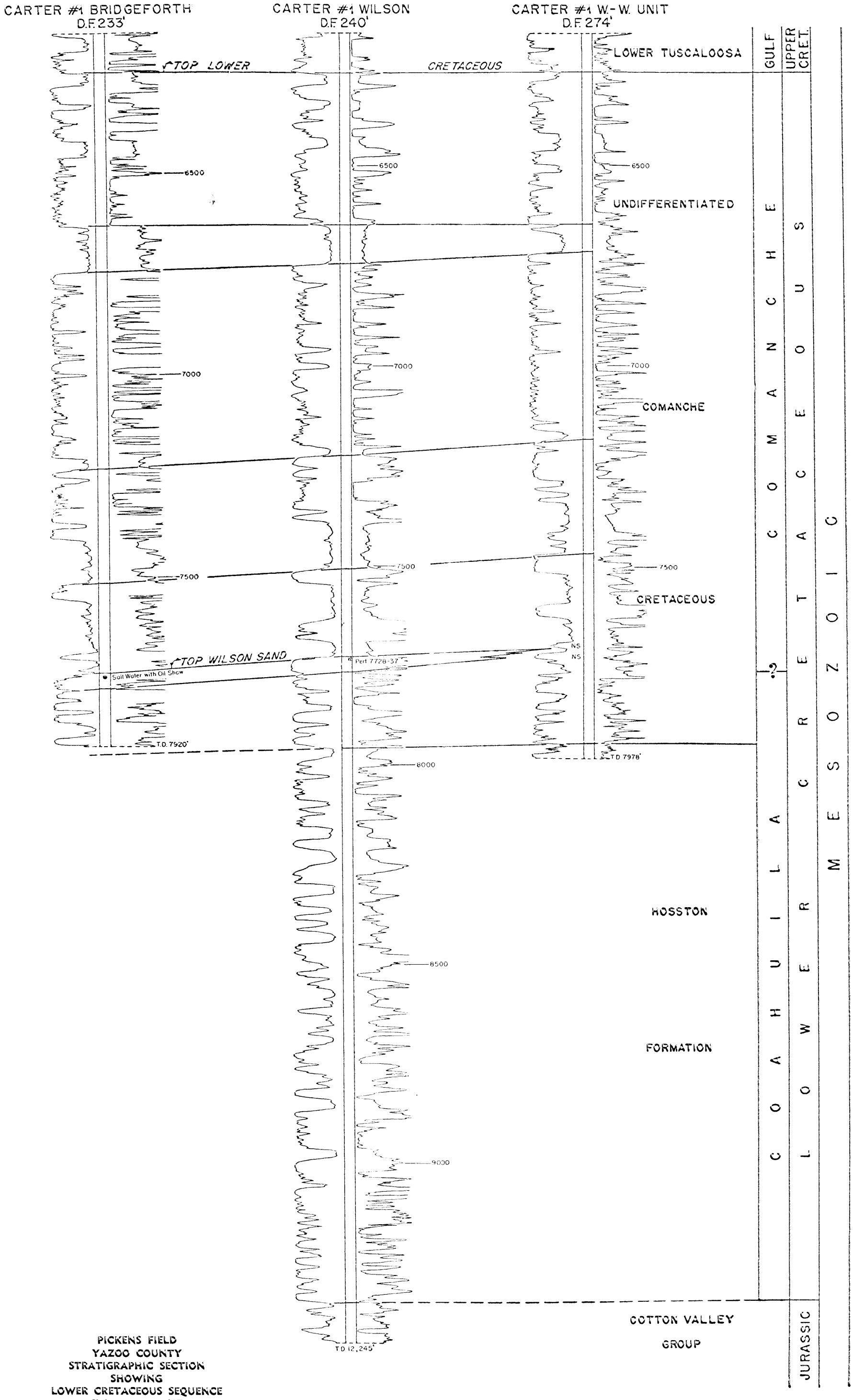
The Cranfield field of Adams County is productive of dry gas from Paluxy sands. The California Company No. 9 Ella G. Lees, discovery gas well from the Paluxy formation, was completed June 27, 1946, with an initial production of 22 MMCF of gas flowing through perforations between depths of 11,772 and 11,794 feet. In December, 1948, two additional Paluxy sands were perforated between depths of 11,664 and 11,690 feet and between depths of 11,578 and 11,592 feet.

The reservoir rock is white, fine to medium-grained, micaceous, tight, hard sand cemented with lime. Typical physical properties of the reservoir rock are presented in Table II.

The structure of the Cranfield field (Plate 24) is a rather symmetrical dome with only minor faulting. The stratigraphic cross-section on the structure map (Plate 25) shows the electrical character of the Washita and Fredericksburg groups and the Paluxy formation. The pre-Gulf Cretaceous erosion of the Washita can be seen on this illustration. The California Company No. 9 Ella G. Lees well has produced 9,746 MMCF of gas as of January 1, 1954. This gas is injected into the unitized Lower Tuscaloosa reservoir. The California Company No. 15 National Gasoline Company well encountered gas shows in two very tight Paluxy sands near its total depth of 11,910 feet. No shows of oil or gas were encountered in the Lower Cretaceous beds in the other two deep tests drilled on the Cranfield structure.

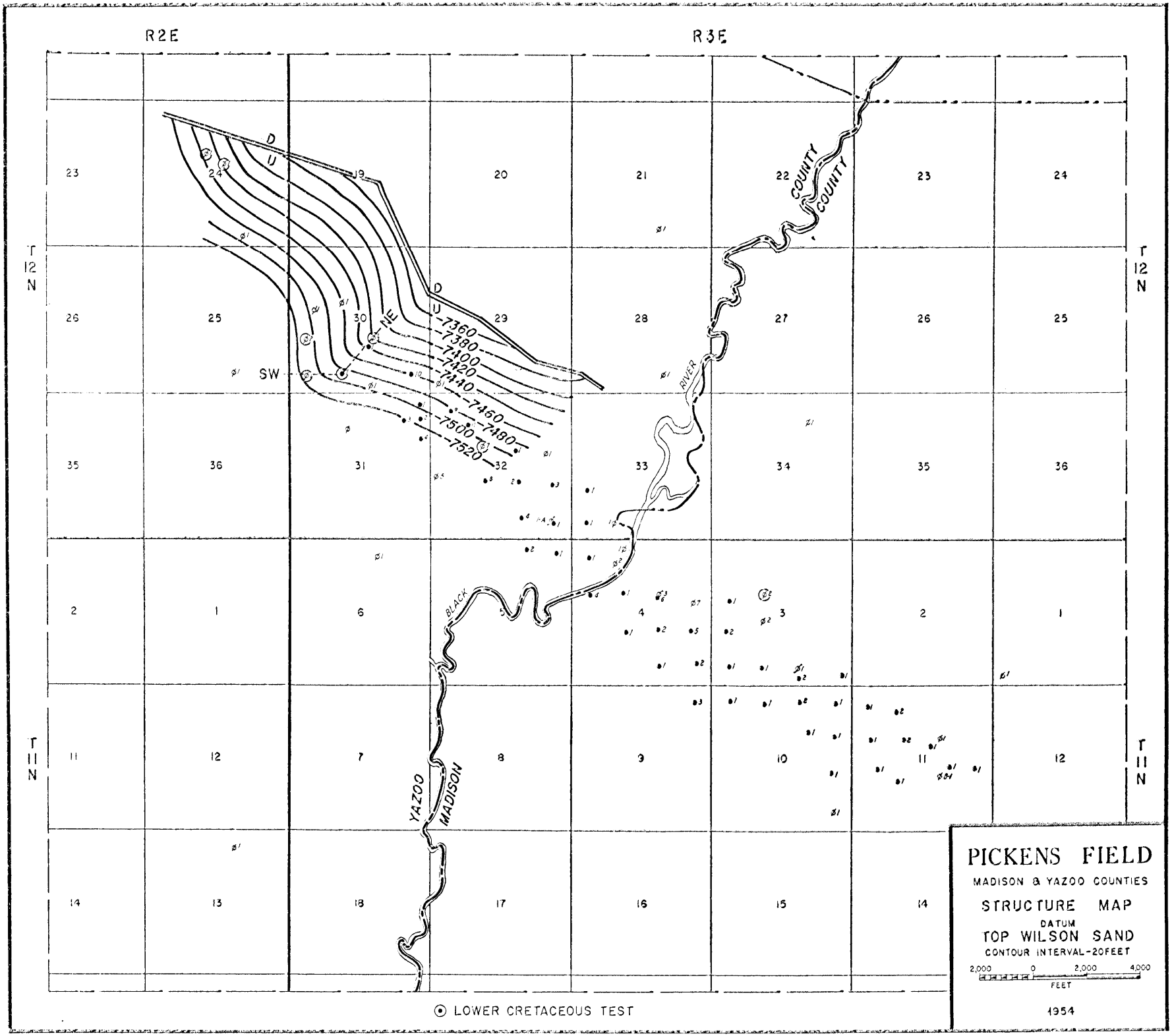
BAXTERVILLE FIELD

Lower Cretaceous oil production in the Baxterville field was discovered by the Gulf Refining Company No. 25 J. M. Andrew well. This well was drilled to a total depth of 13,431 feet and casing was perforated between the depths of 10,821 and 10,841 feet. On initial production test, the well flowed 160 barrels of 40.9° API gravity oil per day through 12/64 inch tubing choke. The reservoir rock is brown, hard, very fine to medium-grained, micaceous, slightly silty, calcareous, well cemented sandstone of probable Fredericksburg age. As of January 1, 1954, this reservoir had produced 4,712 barrels of oil.



PICKENS FIELD
YAZOO COUNTY
STRATIGRAPHIC SECTION
SHOWING
LOWER CRETACEOUS SEQUENCE
SW_____NE

1954


R2E
R3E
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NE
SW
-7360
-7380
-7400
-7420
-7440
-7460
-7480
-7500
-7520
COUNTY
COUNTY
RIVER
BLACK
YAZOO
MADISON
23
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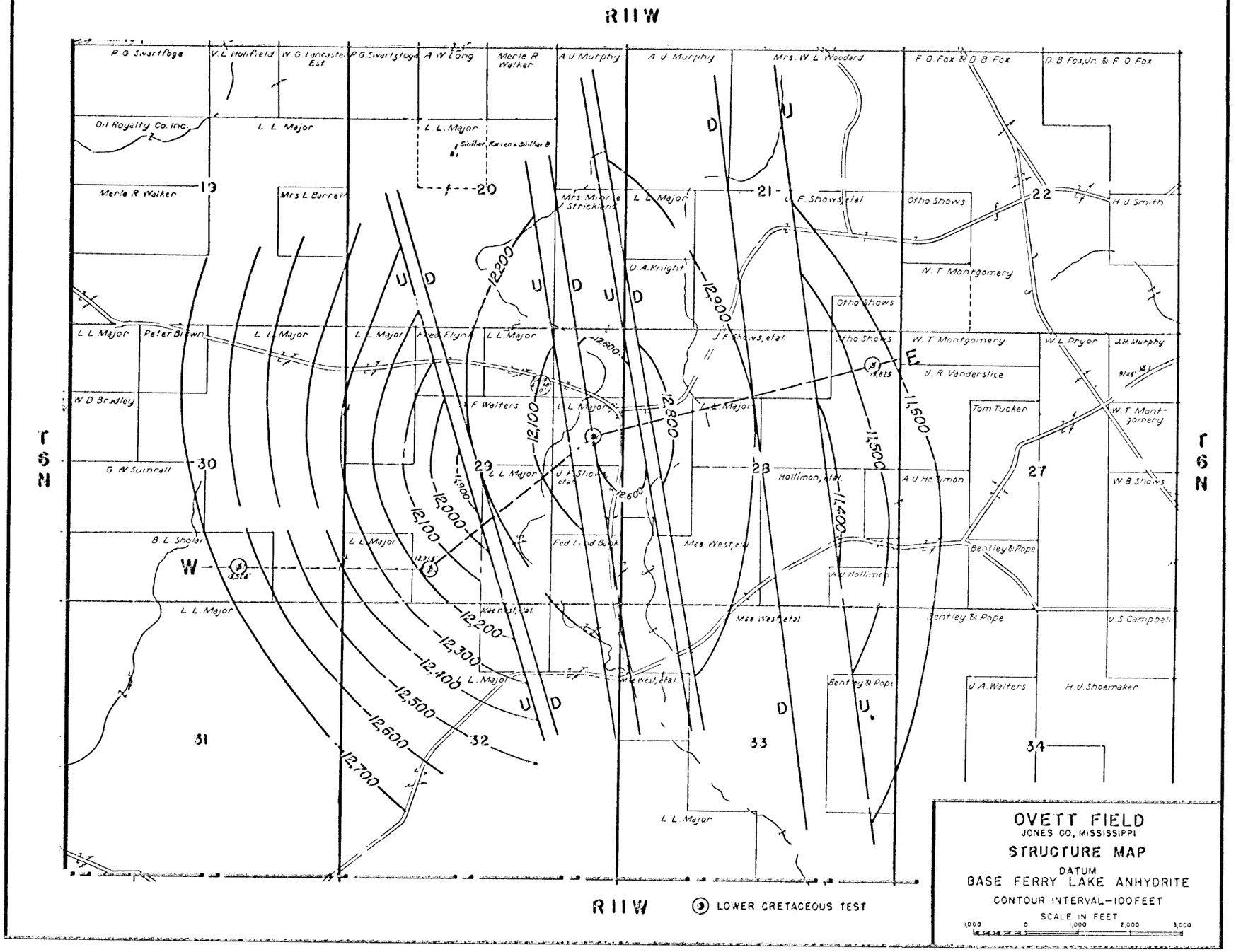
16
15
14
PICKENS FIELD
MADISON & YAZOO COUNTIES
STRUCTURE MAP
DATUM
TOP WILSON SAND
CONTOUR INTERVAL-20FEET
2,000 0 2,000 4,000
FEET
1954
⊙ LOWER CRETACEOUS TEST



OVETT FIELD

JONES CO, MISSISSIPPI

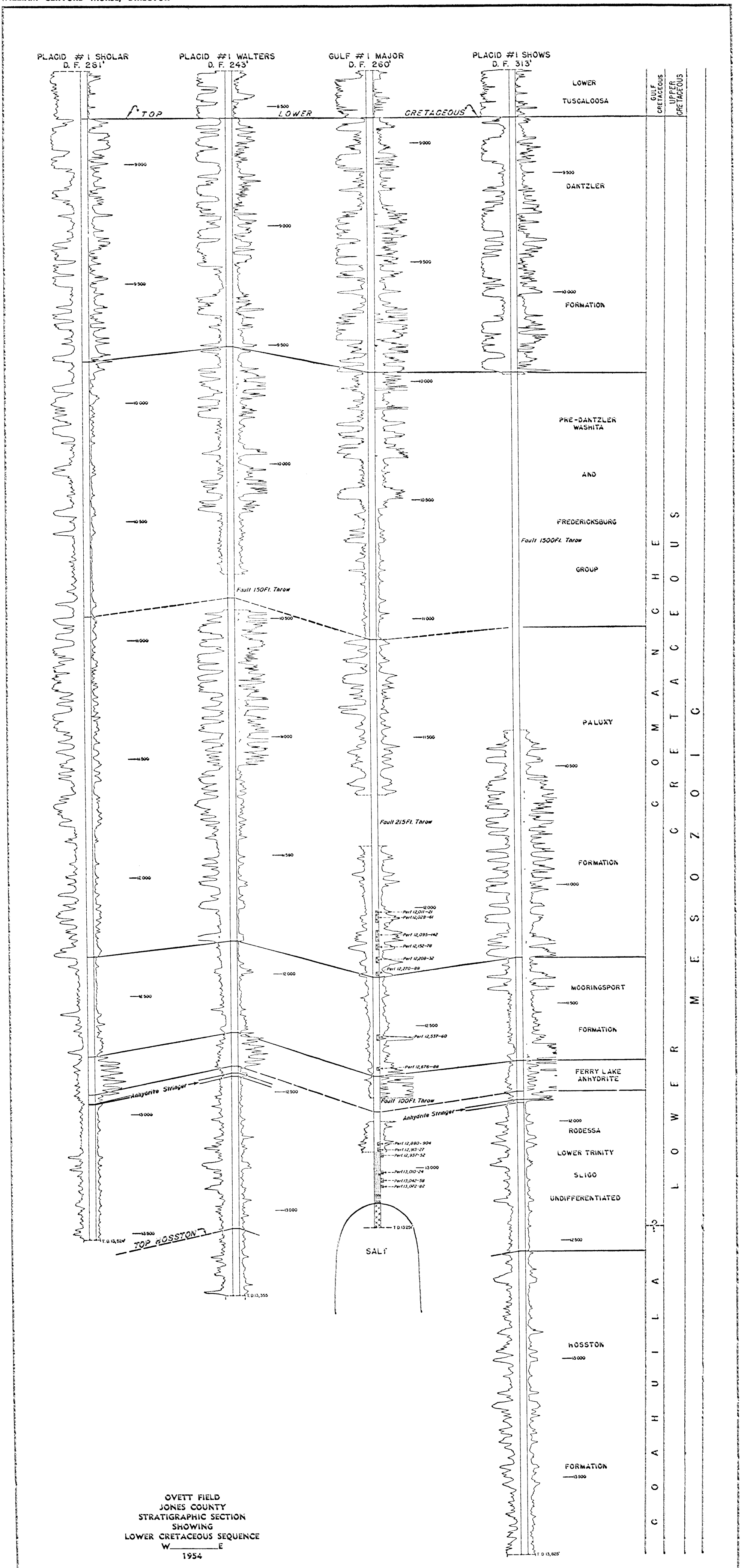
STRUCTURE MAP

DATUM
BASE FERRY LAKE ANHYDRITE

CONTOUR INTERVAL—100 FEET

SCALE IN FEET

1,000 0 1,000 2,000 3,000



OVETT FIELD
JONES COUNTY
STRATIGRAPHIC SECTION
SHOWING
LOWER CRETACEOUS SEQUENCE
W_____E
1954

GULF #1 EDWARDS-TAYLOR
D.F. 357'

GULF #1 J.W. BAILEY
D.F. 296'

HUMBLE #1 A.E. WELBORN
D.F. 370'

LOWER TUSCALOOSA

TOP LOWER CRETACEOUS

8500 DANTZLER

PRE-DANTZLER
9000 WASHITA
AND
FREDERICKSBURG
GROUP

9500

10,000

PALUXY
FORMATION

10,500

11,000

MOORINGSPORT
FORMATION

FERRY LAKE ANHY.

ANHYDRITE STRINGERS

SHOW

11,500

RODESSA
LOWER TRINITY
AND
12,000 SLIGO
UNDIFFERENTIATED

TOP OF PRODUCING SAND

T.D 12,313'

T.D 12,369'

HOSSTON FORMATION

END OF SCHL. 12,500

T.D 12,730'

GULF CRETACEOUS

UPPER CRETACEOUS

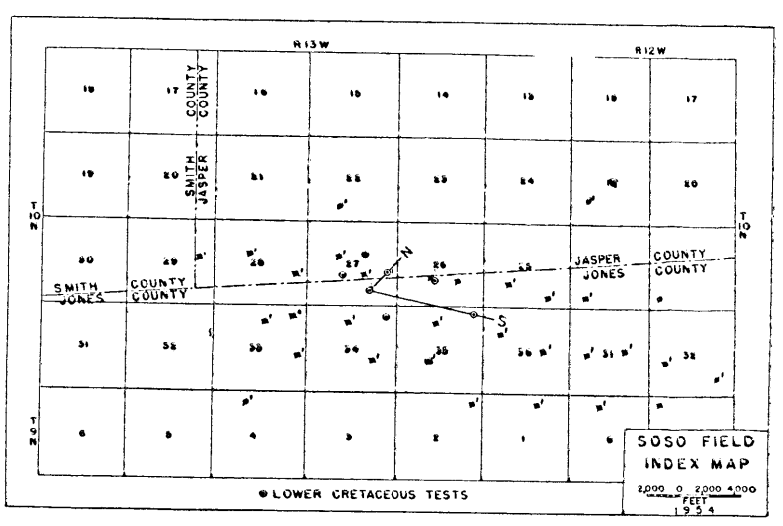
COMANCHE

MESOZOIC

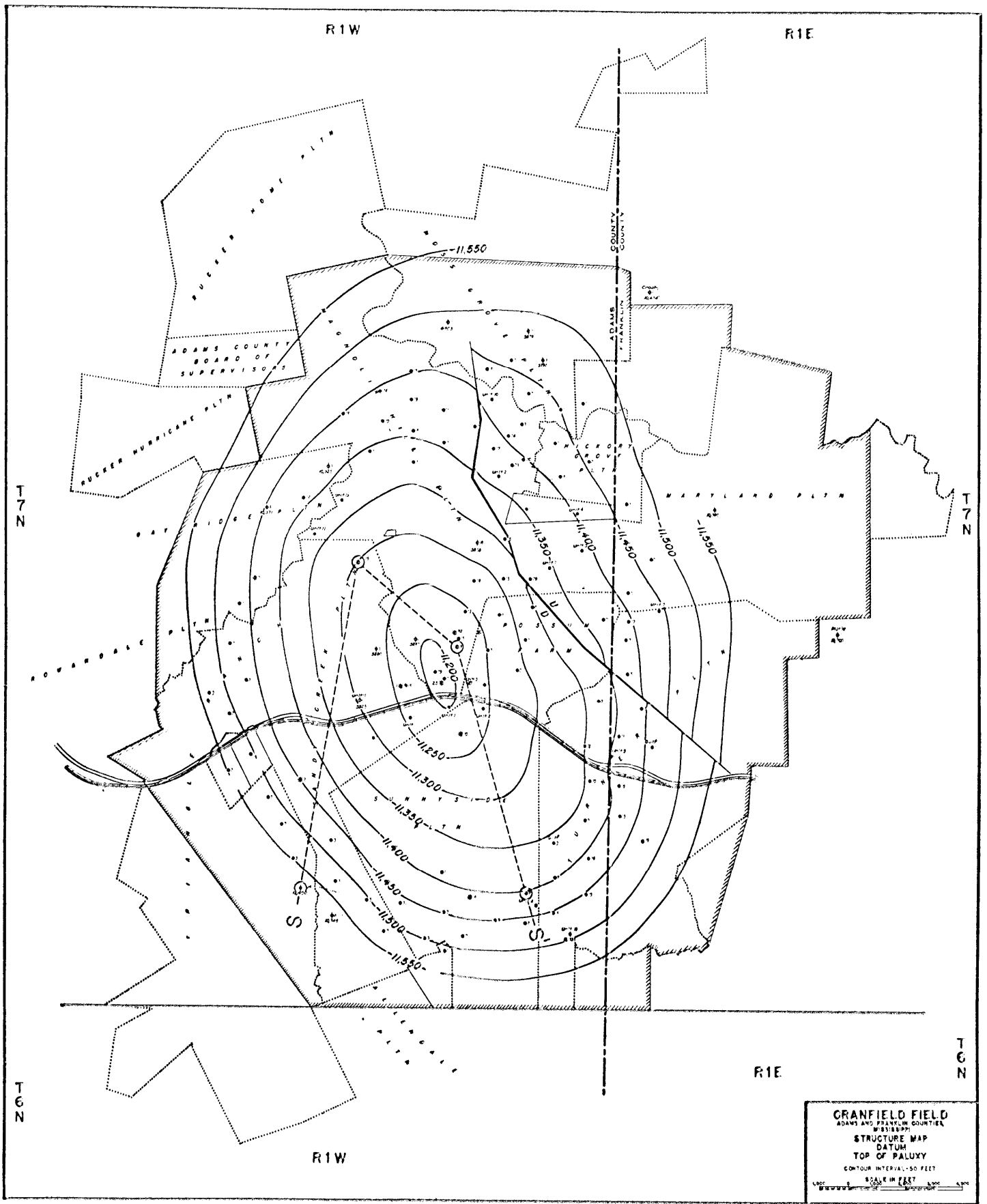
CRETACEOUS

LOWER

COAHUILA(?)



SOSO FIELD
JASPER AND JONES COUNTIES
STRATIGRAPHIC SECTION
SHOWING
LOWER CRETACEOUS SEQUENCE
N S
1954


R1W
R1E
T7N
T6N
ADAMS COUNTY
FRANKLIN COUNTY
ADAMS COUNTY BOARD OF SUPERVISORS
-11,550
-11,500
-11,450
-11,400
-11,350
-11,300
-11,250
-11,200
-11,350
-11,400
-11,450
-11,500
-11,550
S
S
GRANFIELD FIELD
ADAMS AND FRANKLIN COUNTIES, MISSISSIPPI
STRUCTURE MAP
DATUM
TOP OF PALUXY
CONTOUR INTERVAL - 50 FEET
SCALE IN FEET

A good show of gas was found in a sand of probable Fredericksburg age by the Gulf Refining Company No. A-2 W. J. Howard well. Casing was perforated between 10,864 and 10,878 feet, and the well produced 26,239 MCF of gas and 409 barrels of condensate before the reservoir was depleted. The sand is brown to light gray, hard, medium to coarse-grained, micaceous, lignitic, slightly fossiliferous, and calcareous.

Two other deep tests have been drilled on the Baxterville structure; however, neither of these encountered oil or gas shows in Lower Cretaceous strata.

The Baxterville field, a highly faulted structure, is the result of deep seated salt movement. Its structure contour map is based on estimated depths to the top of the Paluxy datum (Plate 26). The northwest-southeast stratigraphic cross-section on the map illustrates the Lower Cretaceous stratigraphy and faulting in the Baxterville field (Plate 27).

HUB FIELD

Gas and condensate in the Hub field were discovered by the Humble Oil and Refining Company No. 3 E. A. Ball well which was completed June 19, 1946. This was the first Lower Cretaceous production obtained in Mississippi. On initial production test, the well flowed 1.49 MMCF of gas and 43 barrels of condensate through perforations between 10,098 and 10,106 feet opposite a sand of Dantzler age. The producing sand is tan to brown, calcareous, silty, micaceous, and very fine to medium-grained. The Dantzler sand reservoir had produced 253 MMCF of gas and 7,127 barrels of condensate as of January 1, 1952. On this date the well was closed in. None of the other six deep tests drilled in the Hub field encountered shows.

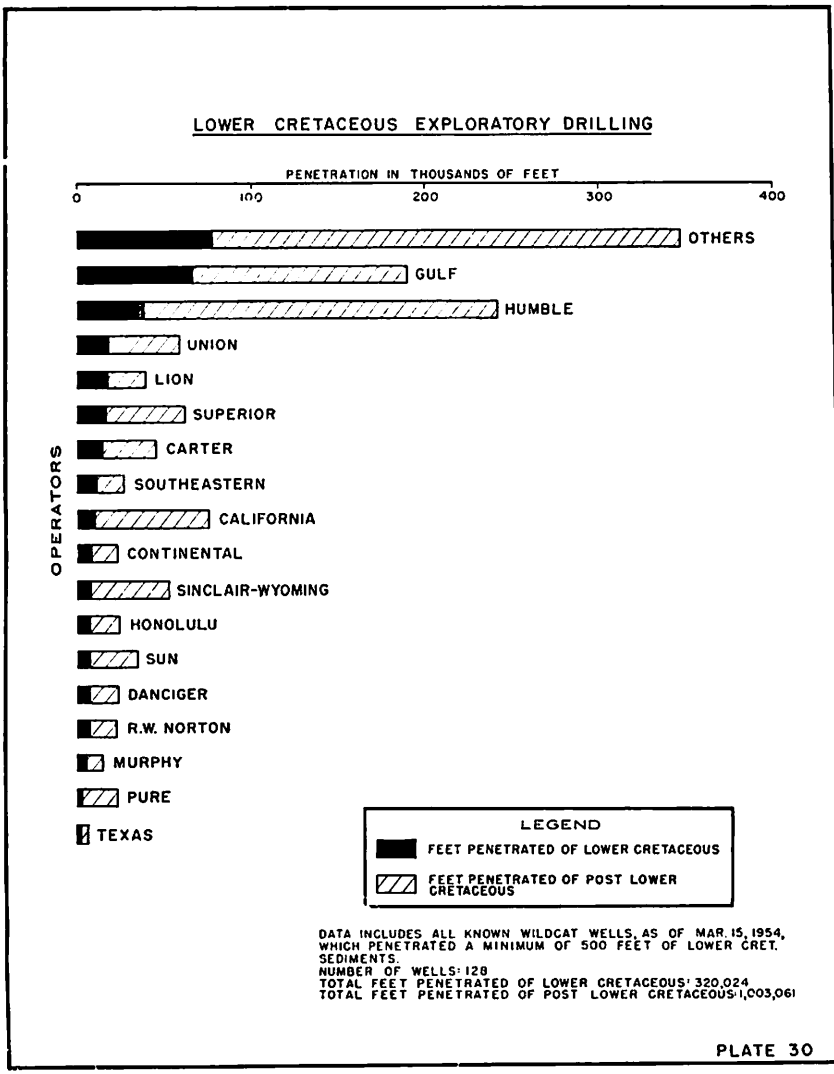
The Hub field is a faulted anticline (Plate 28). The line of north-south stratigraphic cross-sections is indicated on the structure map. An electric log comparison of three Hub field wells (Plate 29) illustrates the stratigraphy of the Dantzler formation and the pre-Dantzler Washita.

OIL AND GAS POSSIBILITIES

The Lower Cretaceous sediments of Mississippi contain an abundance of beds that are suitable for reservoir rocks. They are oolitic and fractured limestones and porous sandstones. Table

II shows some typical physical properties of Lower Cretaceous reservoirs. Ample impermeable beds, such as shale, siltstone, or dense limestone, are present in the section to prevent the upward escape of hydrocarbons from the porous reservoir rock. Many favorable structures, resulting from the movement of deep-seated salt, are present in the central and southern parts of the state. During the deposition of the Lower Cretaceous, conditions were favorable for the formation of the parent material of petroleum and natural gas. Known accumulations are listed in Table I. In addition to these, over a score of wells have encountered oil or gas shows. These wells are listed on Table III and are indicated on the index map, Plate 12, for the purpose of showing the geographic distribution of shows.

Not all of the available information indicates that the Lower Cretaceous will become a prolific producer. Operators have drilled about 128 wells that penetrated at least 500 feet of Lower Cretaceous strata. The total footage, Plate 30, drilled in Lower Cretaceous rock is approximately 320,024; many of the test wells were located on known structures, yet they did not find important production. Considering the size of the structural closure at Cranfield, Ovett, Pickens, Hub, and Baxterville, the small hydrocarbon accumulation has been very disappointing. Drilling subsequent to the discovery of these fields shows that the reservoir rocks are lenticular and that the volume of hydrocarbon present is insufficient to fill the structure. The thin pay section and great depth at Virillia has no doubt discouraged drilling of development wells. The SoSo structure, in the early stage of development, appears to be an important discovery. Other structures, productive in younger beds, such as Carthage Point, Fayette, Brookhaven, Cary, Gwinville, Pistol Ridge, Heidelberg, Jackson, Eucutta, Glazier, Yellow Creek, Flora, and Tinsley, have been tested in part of the Lower Cretaceous formations but have not been found commercially productive. Other structures, that are not productive in younger beds, have been drilled into Lower Cretaceous strata. A noteworthy example is the portion of the Wiggins anticline in Stone County. The complete Lower Cretaceous sequence was penetrated by the Vasen et al No. 1 Fee well located on this large structure. This well had a show in a sand of Hosston age and cannot be considered as condemning the large structure which may be productive on local closure along its axis.


LOWER CRETACEOUS EXPLORATORY DRILLING
PENETRATION IN THOUSANDS OF FEET
0
100
200
300
400
OPERATORS
OTHERS
GULF
HUMBLE
UNION
LION
SUPERIOR
CARTER
SOUTHEASTERN
CALIFORNIA
CONTINENTAL
SINCLAIR-WYOMING
HONOLULU
SUN
DANCIGER
R.W. NORTON
MURPHY
PURE
TEXAS
LEGEND
FEET PENETRATED OF LOWER CRETACEOUS
FEET PENETRATED OF POST LOWER CRETACEOUS
DATA INCLUDES ALL KNOWN WILDCAT WELLS, AS OF MAR. 15, 1954, WHICH PENETRATED A MINIMUM OF 500 FEET OF LOWER CRET. SEDIMENTS.
NUMBER OF WELLS: 128
TOTAL FEET PENETRATED OF LOWER CRETACEOUS: 320,024
TOTAL FEET PENETRATED OF POST LOWER CRETACEOUS: 1,003,061
PLATE 30

CONCLUSION

In southern Mississippi the Lower Cretaceous can be divided into mappable lithologic units. From southern Mississippi northward, the non-clastic sediments change facies from carbonate deposits to gravelly clastics so that the Lower Cretaceous cannot readily be differentiated.

In the area underlain by Louann salt, favorable structures and suitable reservoir rocks are present. Factors favorable to oil and gas accumulation outweigh the unfavorable factors. The Lower Cretaceous sediments of Mississippi warrant further exploration activities.

ACKNOWLEDGEMENTS

The information presented in this paper has been compiled from the files of Gulf Refining Company's Geological Department in Shreveport. Published material[3] has been used in the preparation of the correlation chart. The authors wish to thank the following geologists for their help in preparing illustrations: Messrs. W. B. Fulton, J. B. Currie, D. W. Siple, A. H. Trowbridge, J. A. Otts, Jr., C. R. Scrulock, I. J. Terry, J. B. Tomlinson, J. L. Nichols, and T. S. Blackwell. Sample logs shown on some of the illustrations were made by Mr. E. M. Rice. The drafting was done by Messrs. F. D. Underwood, M. J. Sullins, and J. A. Sullins, and Mrs. B. C. Ten Eyck, and Mrs. M. M. Glazner. Mrs. V. H. Brooks, Mrs. F. S. Brooks, and Mrs. A. W. Richey typed the manuscript and tabulated data. The writers gratefully acknowledge the assistance given by these and other persons. Special thanks are extended to Messrs. B. W. Blanpied and R. T. Hazzard for their helpful suggestions and thoughtful criticism.

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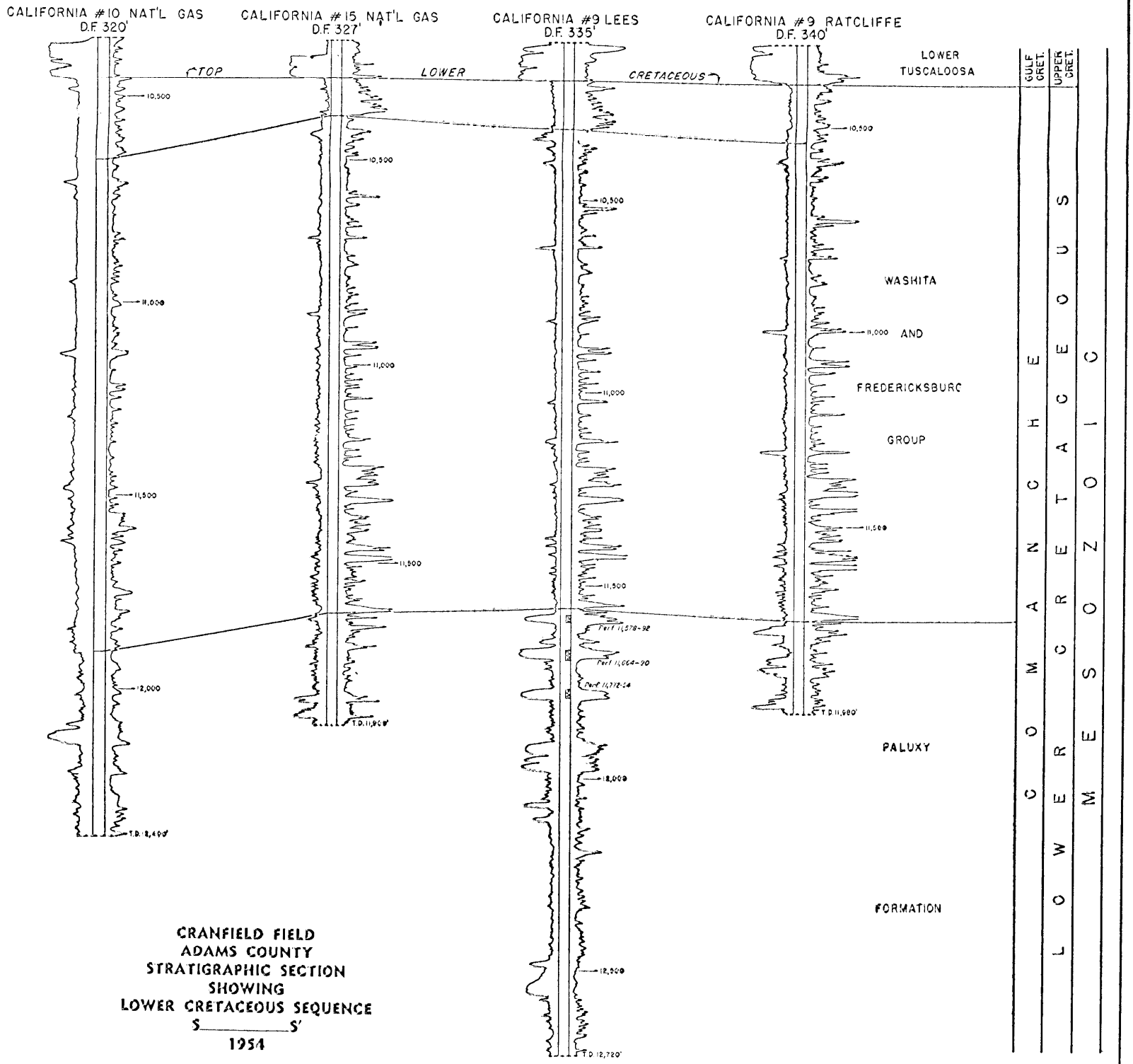


CRANFIELD FIELD
ADAMS COUNTY
STRATIGRAPHIC SECTION
SHOWING
LOWER CRETACEOUS SEQUENCE
S_____S'
1954

R 17 W

R 16 W

T 2 N

T 1 N

COUNTY
COUNTY
MARION
LAMAR

BAXTERVILLE

-11,400
-11,300
-11,200
-11,100
-11,000
-10,900
-10,800

U D

BAXTERVILLE FIELD

LAMAR & MARION COUNTIES

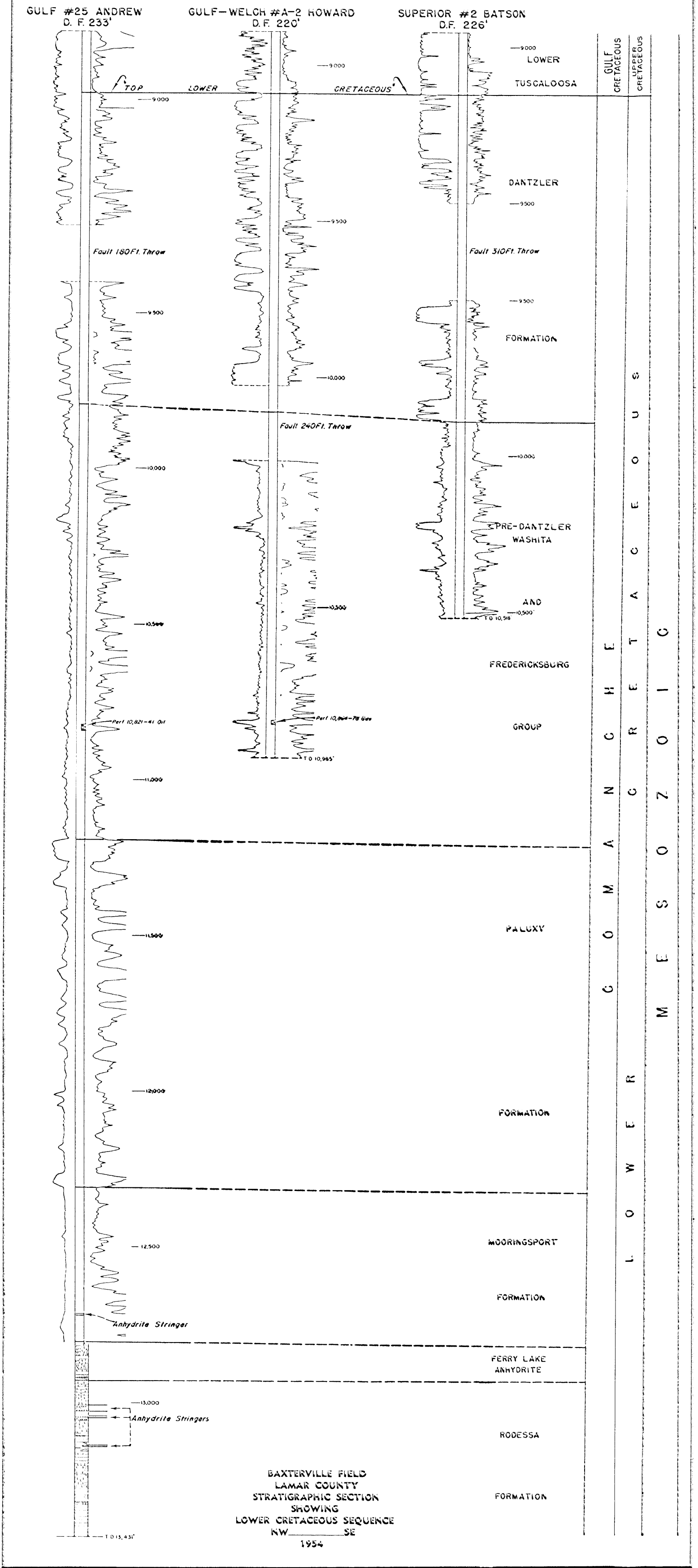
STRUCTURE MAP DATUM
TOP PALUXY FORMATION

CONTOUR INTERVAL-100 FEET

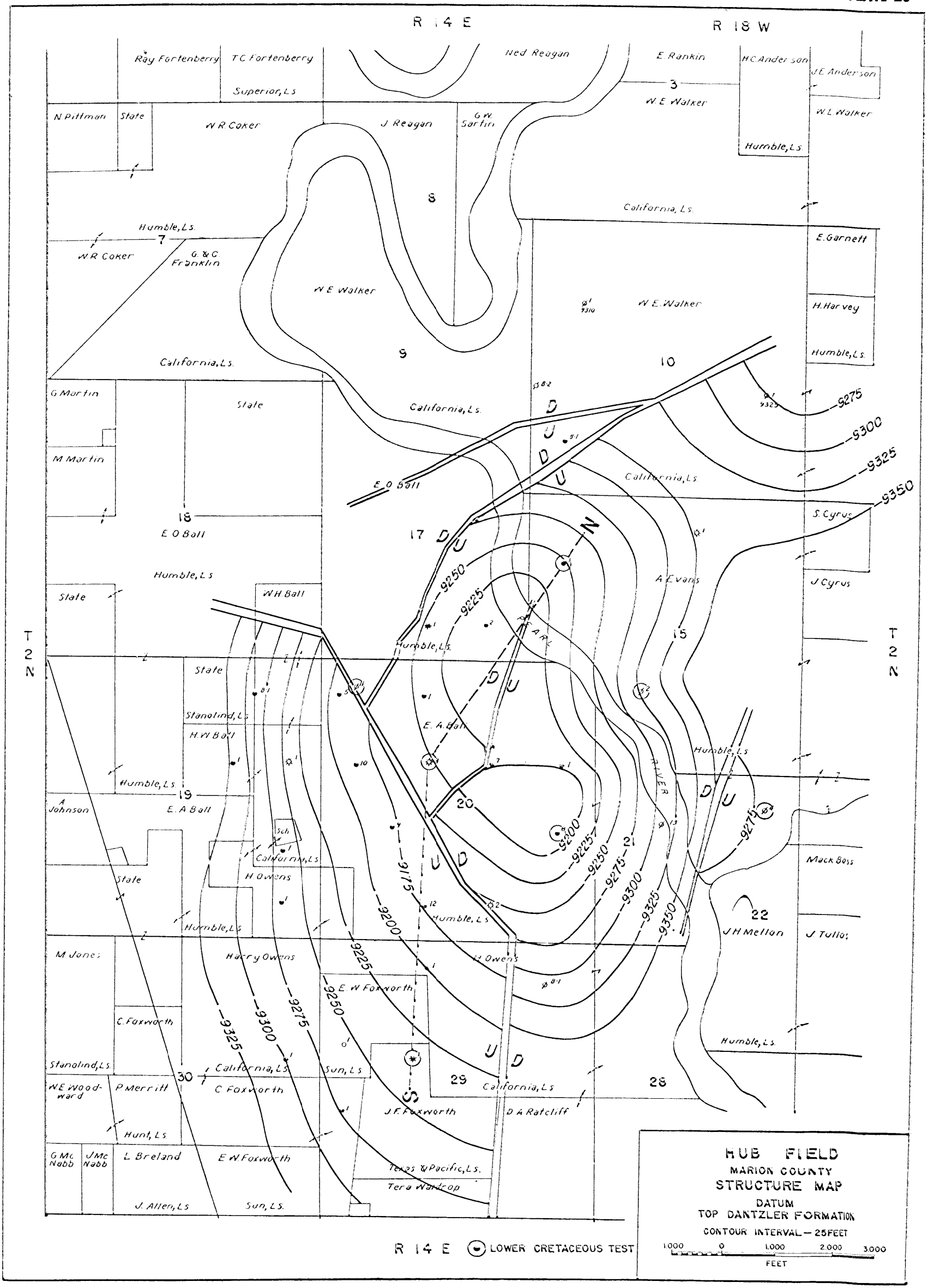
1,000 0 1,000 2,000 3,000
FEET

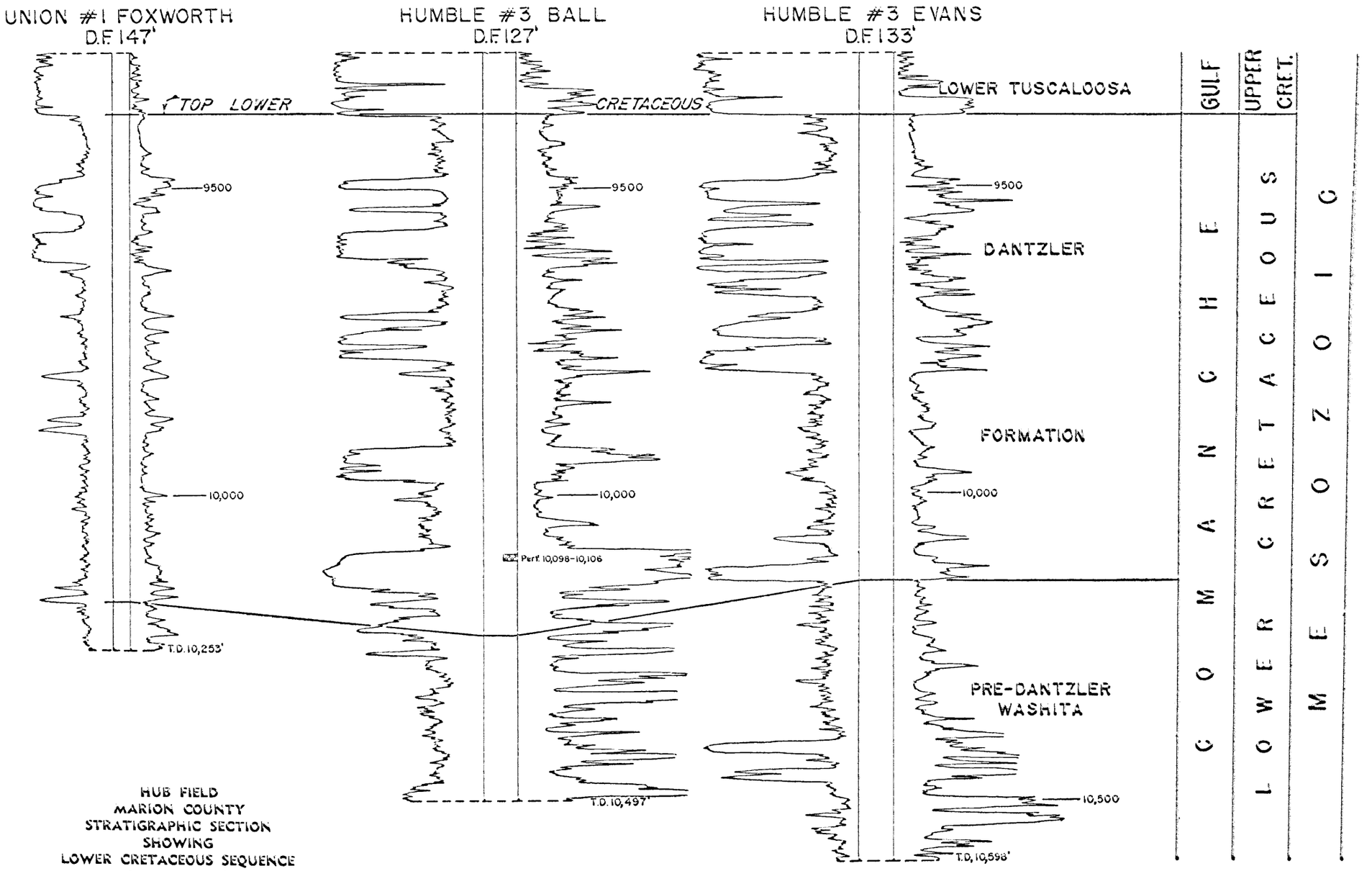
⊙ LOWER CRETACEOUS TESTS
• TUSCALOOSA TESTS

1954



BAXTERVILLE FIELD
LAMAR COUNTY
STRATIGRAPHIC SECTION
SHOWING
LOWER CRETACEOUS SEQUENCE
NW_____SE
1954


R 14 E
R 13 W
T 2 N
Ray Fortenberry
T C Fortenberry
Superior, Ls
Ned Reagan
E. Rankin
H C Anderson
J E Anderson
W E Walker
W L Walker
Humble, Ls.
N Pittman
State
W R Coker
J Reagan
G W Sartin
8
California, Ls.
Humble, Ls.
7
W R Coker
G. & C. Franklin
W E Walker
E. Garnett
H. Harvey
9
10
G Martin
M Martin
State
18
E O Ball
17
E O Ball
A E Evans
J Cyrus
S. Cyrus
Humble, Ls
State
W H Ball
Stanolind, Ls
H W Ball
E. A. Ball
15
19
A Johnson
E. A Ball
20
California, Ls
H. Owens
Mack Boss
22
J H Mellon
J Tullos
M Jones
Harry Owens
E. W Foxworth
C. Foxworth
30
29
28
W E Woodward
P Merrill
C Foxworth
J F Foxworth
D A Ratcliff
Hunt, Ls.
G Mc Nabb
J Mc Nabb
L Breland
E W Foxworth
Texas & Pacific, Ls.
Tera Wardrop
J. Allen, Ls
Sun, Ls.
9175
9200
9225
9250
9275
9300
9325
9350
HUB FIELD
MARION COUNTY
STRUCTURE MAP
DATUM
TOP DANTZLER FORMATION
CONTOUR INTERVAL — 25 FEET
1,000 0 1,000 2,000 3,000
FEET
R 14 E
LOWER CRETACEOUS TEST



HUB FIELD
MARION COUNTY
STRATIGRAPHIC SECTION
SHOWING
LOWER CRETACEOUS SEQUENCE
S_____N
1954