12-1990

Distribution and Migration Patterns of Subsurface Fluids in the Wilcox Group in Central Louisiana

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Recommended Citation

Funayama, Masaaki, "Distribution and Migration Patterns of Subsurface Fluids in the Wilcox Group in Central Louisiana" (1990). *LSU Historical Dissertations and Theses*. 8372.
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DISTRIBUTION AND MIGRATION PATTERNS OF SUBSURFACE FLUIDS IN THE WILCOX GROUP IN CENTRAL LOUISIANA

A THESIS

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Master of Science
in
The Department of Geology and Geophysics

by
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December, 1990

ACKNOWLEDGEMENTS

I would like to thank my advisor, Dr. Jeffrey S. Hanor, for his numerous hours of guidance, encouragement throughout this study, and for his critical review of both the technical content and the English in the various drafts of the text. I would also like to thank those who served as committee members, Dr. Arnold H. Bouma and Dr. Joseph E. Hazel. Thanks also goes to Richard McCulloh of the Louisiana Geological Survey and Chris Wheeler for their invaluable information on this subject material. I would especially like to thank Chek Soonthornsaratul and Kasana Pitakpaivan for their advice and assistance. I also thank Dr. Robert Desbrandes of the LSU Department of Petroleun Engineering and many of the current and former faculty and graduate students in the LSU Department of Geology and Geophysics for helpful discussions.

I gratefully acknowledge Teikoku Oil Company for providing the financial support to study here at Louisiana State University.

Finally, I thank my wife, Tomoko, for her encouragement and understanding during this study.

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ABSTRACT

Variations of pore fluid properties as well as lithologies in central Louisiana were investigated using more than 300 conventional well logs in order to understand processes and patterns of fluid flow in the Wilcox Group in the region. A statistical evaluation of log parameters was done to provide information required for interpreting older logs in the region.

Most of the study area is located between the northern and southern Louisiana salt dome basins, and there is a general lack of significant structural deformation. The two discrete sand dominated zones in the study area are the Wilcox and the post-Vicksburg groups. These are stratigraphically separated by the predominantly shaly Claiborne through Vicksburg groups, which are thickest and shaliest in the southern portion of the study area.

SP-derived salinity profiles on regional cross sections suggest two sources of dissolved salt in the pore fluids: the northern and the southern salt domes. Dissolved salt may have been transported laterally distances exceeding 100 km. In the northern part of the study area, pore water salinity progressively increases with depth through the entire Miocene-Wilcox sequence, implying efficient vertical communication throughout this 12,000 foot stratigraphic sequence. Where the Claiborne-Vicksburg shale sequence thickens to the south, however, there

is a marked discontinuity in salinity with depth reflecting vertical hydrologic compartmentalization. Calculated pore water densities vary little vertically within the post-Wilcox.

The occurrence of hydrocarbons in the Wilcox of central Louisiana may have been controlled by the presence of structural highs, La Salle arch, sand distribution in the Holly Spring Delta of the lower Wilcox, the major impermeable stratigraphic barrier of the Claiborne-Vicksburg shale interval, the areal limitation of the Big Shale as a stratigraphic barrier, and the progressive decrease in oil viscosity updip to the north.

INTRODUCTION

The sand-dominated Wilcox Group in central Louisiana has produced significant amount of oil and gas in Louisiana with peak production, oil in 1971 and gas in 1973 (Independent Petroleum Association of American, 1989). Although problems of pore fluid migration in hydrocarbon producing areas in south Louisiana have been examined in recent years (Hanor and Bailey, 1983; Hanor 1984, 1987; Hanor et al., 1986; Bennett and Hanor, 1987; Hanor and Sassen; 1990; Bray and Hanor, 1990), there has been relatively little work on fluid migration in the Wilcox. Recent organic geochemical studies have shown that Wilcox oil can be differentiated on the basis of composition from other oils and that oils both in the updip and downdip Wilcox reservoirs have same origin (Sassen et al., 1988; Sassen, 1990). These studies further suggest that the sand dominated Wilcox facies in central Louisiana has been a possible conduit for a large-scale lateral fluid migration of hydrocarbons from south-central Louisiana to central- and north Louisiana (Sassen et al., 1988; Hanor and Sassen, 1990; Sassen, 1990).

Present subsurface fluids in the Wilcox can presumably provide some constraints on the topic, and the regional study on subsurface fluid properties will provide a better understanding of fluid migration in central Louisiana. For example, stratigraphic or areal salinity variations reflect in part the degree of reservoir communication between different porous stratigraphic units. Pressure regime also reflects the fluid transmissibility and can be used to help to determine the direction of the fluid flow if suitable measurements are available. Temperature and pressure are important parameters in calculation of density and viscosity of the pore fluids. The resulting density and viscosity are of importance in evaluating the driving force and the direction of pore water and hydrocarbon movement.

The purpose of this study is to investigate present pore fluid properties in the Wilcox and adjacent sediments and to determine if spatial variations in these properties can be related to past and ongoing fluid flow and to hydrocarbon occurrences in the Wilcox in central Louisiana. Both new and old well logs are the primary sources of data for this study. Several new techniques were developed to incorporate data from older logs into the study. An additional purpose of this study is to provide a detailed discussion of calculation procedures for pore water properties and to point out practical problems remaining to be solved.

Economically important resources in Cenozoic sediments in central Louisiana are oil/gas and lignite particularly in the Wilcox Group. This paper will discuss only oil and gas resources.

STUDY AREA AND GEOLOGY

Geologic Setting

Figure 1 shows the study area, which includes portions of Franklin, Caldwell, Winn, Natchitoches, Sabine, Grant, La Salle, Concordia, Avoyelles, Rapides, Veron, Allen, Evangline, St. Landry, Point Coupee, West Feliciana, East Feliciana, and East Baton Rouge parishes. Circles show the location of examined wells. The term "central Louisiana" will be used in this study to refer to the area shown in Figure 1. The hydrocarbon prolific region is located in the northern part, and the rest of the region is relatively non-productive (Figure 9, 10). Salt domes are located in the northern and southernmost portions of the area (Figure 2). The southernmost part is in an area of growth faulting. The rest of the study area has the following characteristics: 1) lack of salt diaprism and the associated significant structural deformation; 2) general lack of growth faults; 3) dominance of sandstone facies of fluvial-deltaic-marine origin.

The distribution of salt domes is of importance for this study because the domes are potential sources of salt dissolved into pore water. Reported salt domes, including unverified salt domes inferred by changes in thickness or facies, are shown in Figure 3. Although entire deep seated Louann salt has not been shown, Lawless and Hart (1990) showed an interpreted seismic section documenting the existence of thin undeformed Louann salt in La Salle Parish.

Stratigraphy

The regional stratigraphy of the Gulf Coast has been summarized by many authors, including Murray (1961) and Rainwater (1967, 1968). Most of the Cenozoic section in the Gulf Coast is composed predominantly of siliciclastic sediments. These sediments were deposited in environments ranging from fluvial to shallow marine.

Figure 4 shows the general stratigraphic framework in Louisiana. Cretaceous carbonate and clastic rocks are overlain by the shale-dominant Paleocene Midway Group. The Midway Group is overlain by the Paleocene-Eocene Wilcox sandstones and shales. Subsequent units are the shale dominant Claibone, Jackson and Vicksburg Groups, which range in age from Eocene to Oligocene. These in turn are overlain by post-Vicksburg sand-dominated sediments, including the Oligocene Frio Formation.

Terms such as "Midway" and "Wilcox" have been used in both chronostratigraphic and a descriptive-lithostratigraphic sense. This paper will use the term Wilcox Group as a lithologic unit and the term Paleocene-Eocene as a chronostratigraphic unit. The

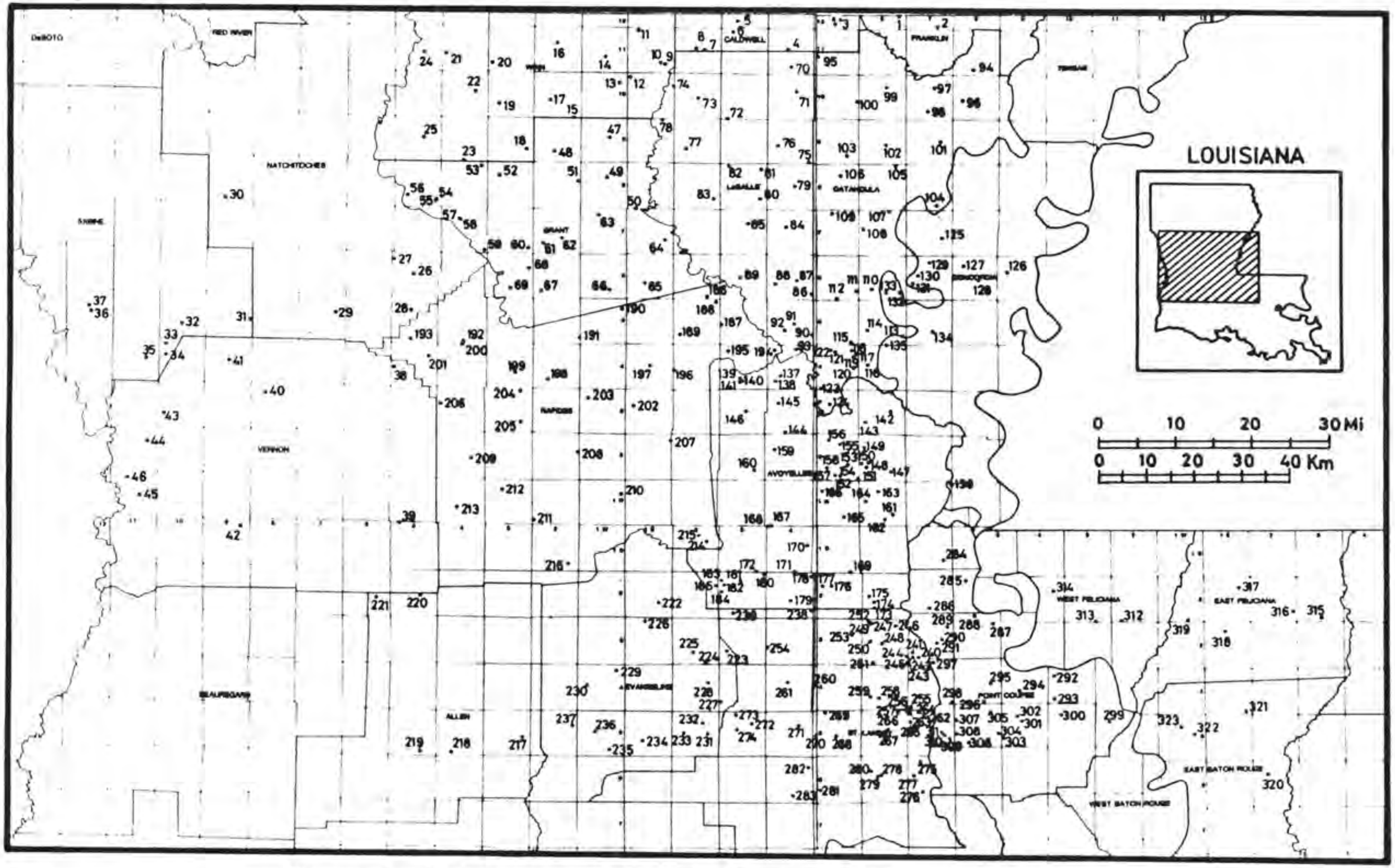

Figure 1. Index map of the study area with well control.

Numbers refer to wells listed in Appendix 3.

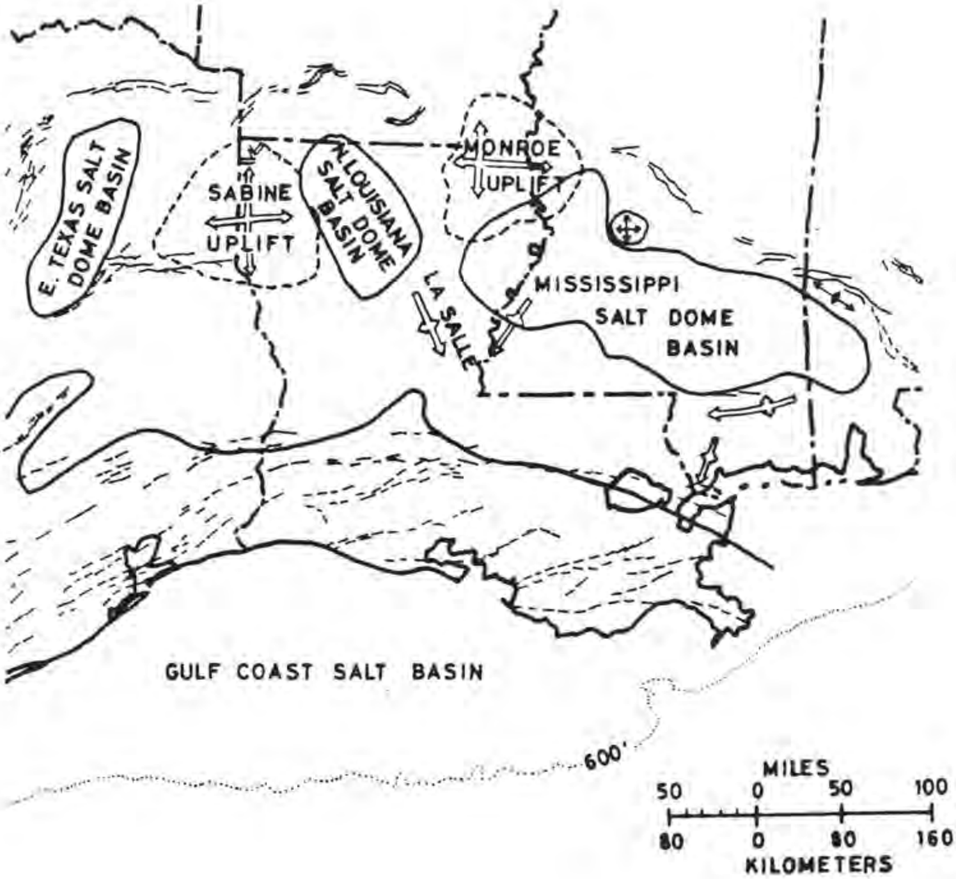

Figure 2. Major tectonic structures of the northern Gulf of Mexico Rim (modified from Holcomb, 1971).

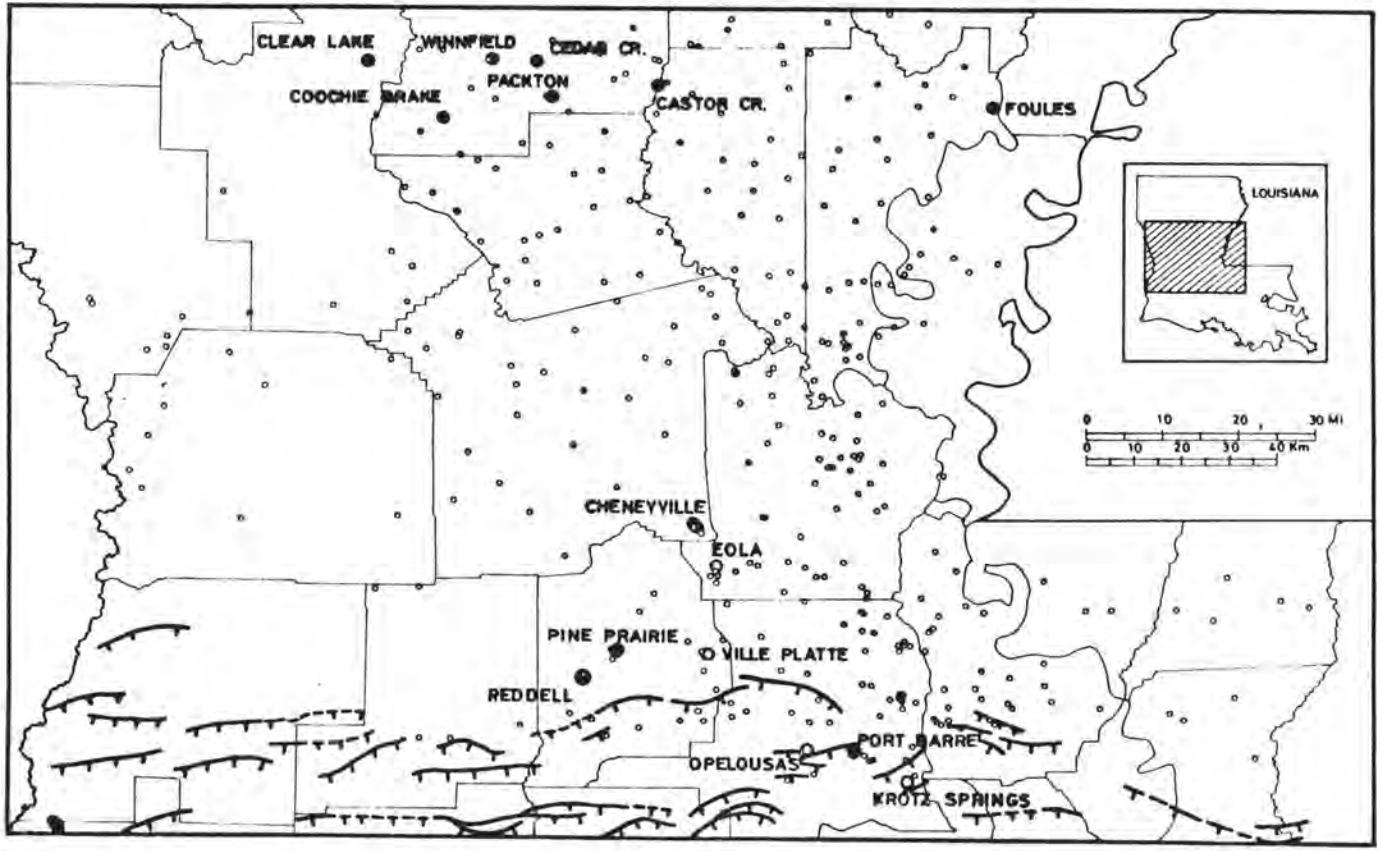

Figure 3. Tectonic structures in the study area. Blackened circle represents salt domes, opened circle represents inferred salt domes (compiled from Louisiana Geological Survey, 1981; Dixon, 1965; A.A.P.G., 1972; Meyeroff, 1967). Small circles show location of study wells.

stratigraphic framework of the Wilcox has been a subject of long debate (Durham and Smith, 1958; Fisher, 1961). There are still some differences in stratigraphic nomenclature in the literature (e.g., A.A.P.G., 1988, Louisiana Geological Survey, 1980, in dealing with Carrizo Formation). As noted by Echols and Malkin (1948) and by Nunn (1986), the lower boundary of the Wilcox Group as defined by lithologic or log chracteristics is not always consistent with paleontological data.

Stratigraphic subdivisions of the Wilcox Group have been based primarily on outcrops. Several local subsurface subdivisions or horizons exist in the literature (e.g., Shreveport Geological Society, 1945, 1961). However, regionally correlatable subdivisions are rare (Figure 6). One, probably the only possible regional subdivision of the subsurface Wilcox Group in the study area, is an upper and lower Wilcox separated by the base of the Big Shale (Galloway, 1968; McCulloh and Eversull, 1986), which is a widely traceable shale marker (Figures 5 and 6). Stratigraphic work using planktonic microfosils is rare in this study area. Nunn (1986) and Glawe (1989) reported planktonic foraminiferal assemblages as well as the stratigraphic positions mostly on the upper Wilcox. Both paleontologic (Glawe, 1989) and lithologic data (Lawless and Hart, 1990) suggest the Big Shale is transgressive in origin.

COMPOSITE COLUMNAR SECTION OF LOUISIANA

ERA	SYSTEM	SERIES	GROUP	FORMATION	REMARKS
CENOZOIC	QUATERNARY	HOLOCENE		Recent alluvium	
		PLEISTOCENE		Loess	Forms a veneer on terraces locally.
				Prairie	Fluviatile and coastwise terraces at surface, subsurface marine equivalents downdip zoned on paleontology.
				Montgomery	
				Bentley	
				Williana	
				Citronelle	
	TERTIARY	PLIOCENE			Not recognized at surface except for Citronelle, possibly, in part; zoned in marine subsurface on paleo.
		MIOCENE		Fleming	Subsurface marine beds zoned on paleo — arbitrarily into upper, middle and lower.
				Catahoula	
		OLIGOCENE		Anahuac	Recognized in subsurface only.
				Frio	Mid. Frio (Hackberry) is a subsurface wedge
			Vicksburg	Nash Creek(W) = Rosefield (E)	These are surface units, not subdivided in the subsurface.
				Sandel	
		EOCENE	Jackson	Mosley Hill	Most of these have both surface and subsurface expression.
				Danville Landing	
				Yazoo	
				Moodys Branch	
			Claiborne	Cockfield	
				Cook Mountain	
				Sparta	
				Cane River	
			Wilcox	Carrizo	These are surface units, undifferentiated in the subsurface.
				Sabinetown	
		PALEOCENE		Pendleton	
				Marthaville	
				Hall Summit	
				Lime Hill	
				Converse	
				Cow Bayou	
				Dolet Hills	
				Naborton	
			Midway	Porters Creek	These units are present only very locally at the surface.
				Kincaid	
MESOZOIC	CRETACEOUS	GULF	Navarro*	Arkadelphia	The only Mesozoic sediments (all upper Cretaceous) that have been identified at the surface are those on only a few piercement salt domes in the northern part of the state.
				Nacatoch	
				Saratoga	
			Taylor*	Marlbrook*	
				Annona*	
				Ozan*	
			Austin*	Brownstown*	
				Tokio*	
			Eagle Ford*	Upper #	
				Lower #	
			Tuscaloosa	Upper	
				Middle	
				Lower	
		COMANCHE	Washita*	South Tyler*	Washita units are present primarily within the salt-dome basins of the Interior Salt Basin (subsurface only).
				Buda*	
				Grayson*	
				Main Street*	
				Weno-Pawpaw*	
				Denton*	
				Fort Worth*	
				Duck Creek*	
				Kiamichi*	
			Fredericksburg*	Goodland*	Fredericksburg and upper parts of the Trinity are not present over highest elements of the Sabine Uplift; these and older Comanche units are also absent over highest elements of the Monroe Uplift.
				Paluxy*	
			Trinity*	Rusk*	
				Ferry Lake*	
				Rodessa*	
				James*	
				Pine Island*	
			Coahuila*	Sligo	
				Hosston	
	JURASSIC	UPPER	Cotton Valley*	Dorcheat*	# Units proposed by E. G. Anderson in Basic Mesozoic Study in Louisiana, the Northern Gulf Coastal Region, and the Gulf Basin Province. Louisiana Geological Survey Folio Series No. 3, 1979. * These units are more properly designated as time-stratigraphic rather than rock-stratigraphic, i.e., stage rather than group and substage rather than formation.
				Shongaloo*	
				Bossier*	
			Louark*	Haynesville	
				Smackover	
				Norphlet	
		MIDDLE LOUISIANA SERIES #		Louann	
		LOWER		Werner	
	TRIASSIC	UPPER		Eagle Mills	

Upper Paleozoics have been encountered to date in two deep wells Union Producing Co., A-1 Tensas Delta, Morehouse Parish, Exxon, 1-Boise Southern, Sabine Parish.

LOUISIANA GEOLOGICAL SURVEY - 1980

Figure 4. Stratigraphic framework of Louisiana (from Louisiana Geological Survey,1980).

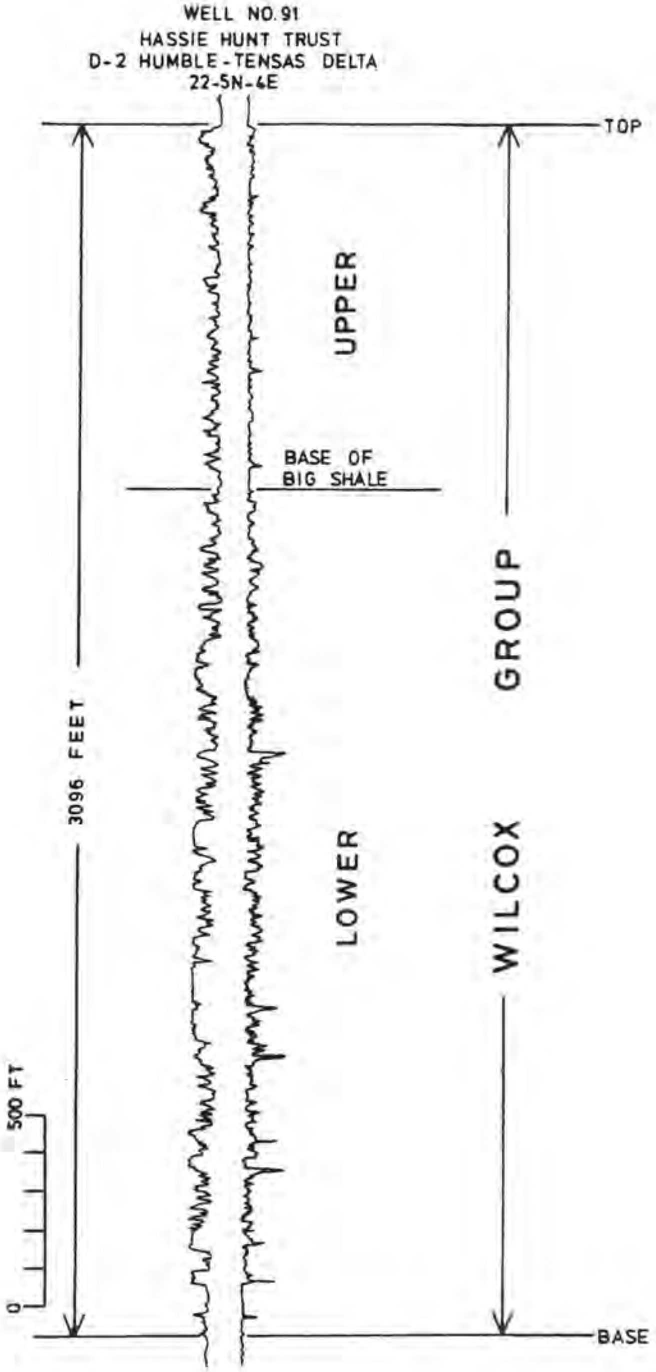

Figure 5. Typical example of SP-resistivity log response of the Wilcox Group in the study area (well no. 91).

Lithofacies and Depositional Environment

The Wilcox Group is dominated by sand in central Louisiana. A vast influx of clastic materials that now comprise the Wilcox Group was supplied to the Gulf Basin during the Eocene as a result of uplift initiated in late Paleocene time of the Cordilleran system in northern Mexico and the Rocky Mountain area. These clastic sediments have a maximum thickness of 23,000 ft (7,000 m, the entire Eocene) in south Texas with lesser thicknesses to the northeast and east. As with the Eocene, the overlying Oligocene section is thicker and more sandy along the Texas coast than in Louisiana. (Fails, 1990).

Echols and Malkin (1948) and Galloway (1968) named a deltaic sandstone body widely developed in the lower Wilcox as the Holly Spring Delta System, which is characterized by thick sand thickness and a large number of lignite beds. Maximum progradation occurred during deposition of the middle to lower parts of the delta system (Galloway, 1968). The deltaic system resembles to the Rockdale delta in Texas, though the thickness of the Holly Spring Delta is about half that of the Rockdale Delta. The lower Wilcox has been described as a high constructive delta system (Fisher, 1969). The upper Wilcox in Texas has been described, on the other hand, as a wave dominated, high-destructional delta system (Fisher, 1969). However, there is no systematic study of the upper Wilcox in Louisiana.

The Big Shale marker bed is traceable over most of the study area. However, the thickness of the Big Shale varies greatly and the areal extent of the Big Shale where it is more than 20 feet thick is limited. The Big Shale cannot be identified in the northern updip part of the Wilcox. The Big Shale overlies a channel fill-type shale called the "anomalous shale" in Avoyelles and St. Landry Parishes (McCulloh and Eversull,1986). Lowry et al. (1986) has called this channel the St. Landry Canyon.

The Wilcox becomes progressively shaly, and more marine in character, down dip to the south. The downdip Wilcox rapidly thickens basinward across numerous growth faults (Galloway, 1968).

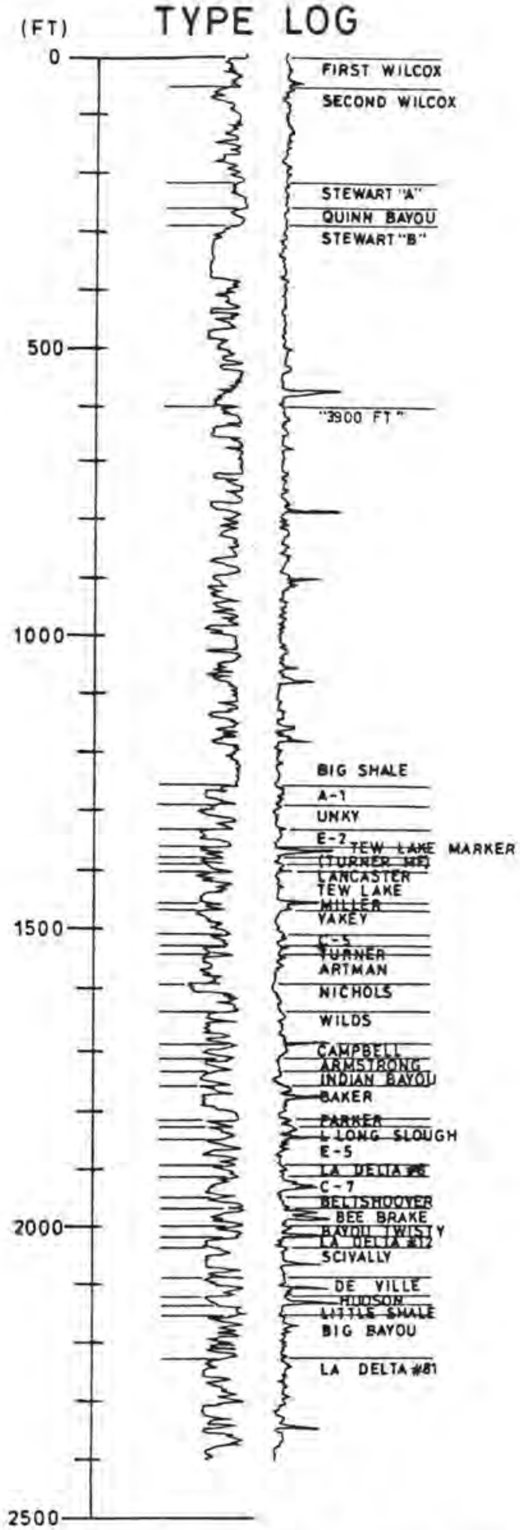

Figure 6. Local subdivisions of the Wilcox Group (modified from Shreveport Geological Society, 1961).

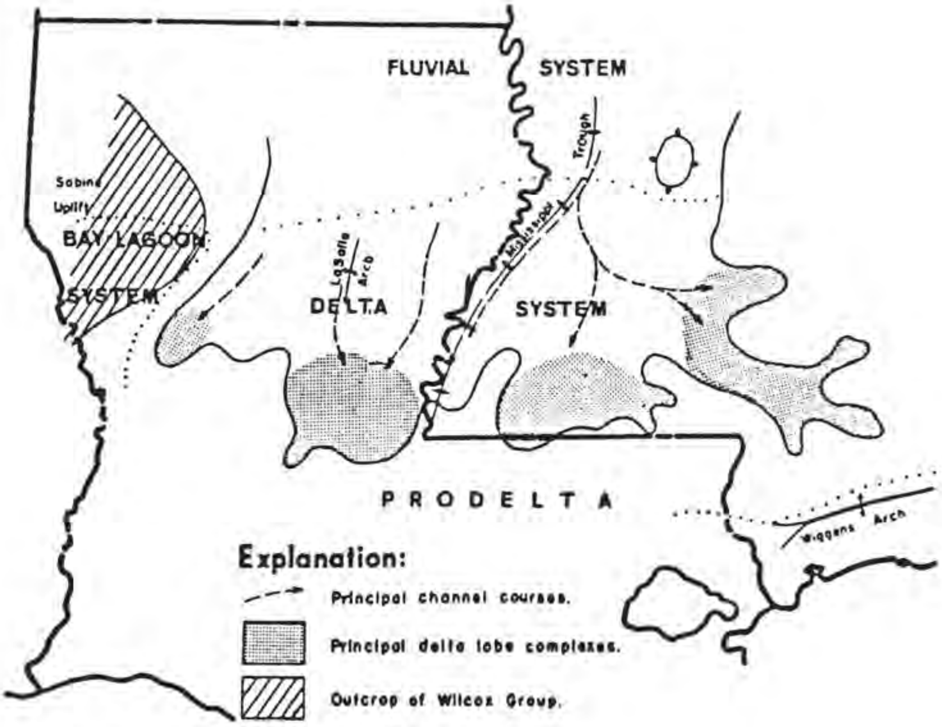

Figure 7. Depositional systems of the lower Wilcox Group (from Galloway, 1968).

Pore Fluid Characteristics

Pore fluids as discussed here refer to mainly pore waters at depth unless specified. This water is sometimes called formation water, subsurface water, brine, interstitial water, connate water, and oilfield water. Some terms are genetically related to the proposed origin and some are not. The definition of each term is relatively clear. However, many of these terms are loosely used or misused. Here the term pore water, having no genetic meanings, will be used to avoid confusion.

Available information on pore waters in central Louisiana, including their chemical composition, salinity, density, and resistivity (Hawkins and Moore, 1956a,b; Hawkins et al., 1963a; Collins, 1975; Pettijohn et al., 1988) is rather sparse considering the active hydrocarbon exploration/development history in this region. The above listed references cover many Wilcox reservoirs, which the major hydrocarbon producing zone in central Louisiana. Chemical analyses in Hawkins et al. (1963a) clearly show that pore waters in the Wilcox reservoirs are sodium chloride dominant (Table 1).

Table 1. Examples of chemical compositions of pore water from the Wilcox reservoirs (from Hawkins et al., 1963a; concentrations in mg/L).

Field	Ca	Mg	Na	HCO_3	SO_4	Cl	TDS
Big Bayou	2,390	680	44,901	220	27	75,300	123,518
Catahoula Lake	1,620	590	36,471	177	30	60,700	99,588
Fairview	2,000	400	45,400	426	0	74,500	122,726
Joyce	232	146	12,093	423	5	19,219	32,118
Nebo-Hemphill	1,770	580	36,274	366	60	60,500	99,550
Olla	1,071	339	25,479			39,336	66,225
Saline Lake	2,740	620	51,295	378	44	85,500	140,577

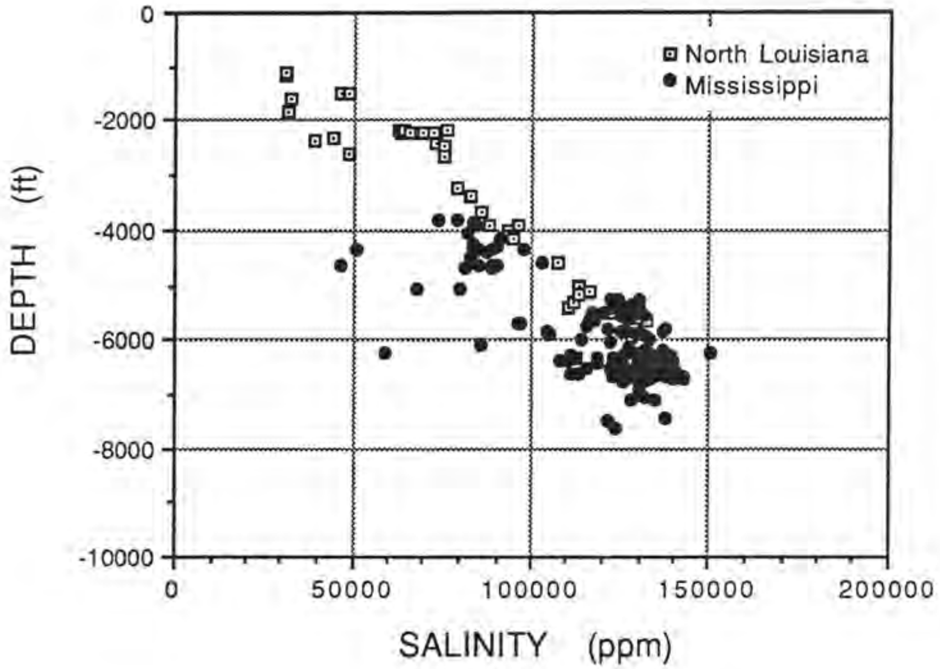

Figure 8. Salinity versus depth plots of the Wilcox Group (data from Hawkins et al., 1963a, b; concentrations were converted to ppm for later comparison to data generated in this study).

Economic Geology

Oil and Gas Production

Oil and gas exploration in the Wilcox is unlike that of the post-Eocene sequence in the Louisiana Gulf Coast because much of the productive territory of the Wilcox is outside the area of typical salt-basin tectonics. Productivity of the Wilcox Group is spatially erratic and the exploration history has been variable (Owen, 1975). Figure 9 and 10 show the Wilcox production trend and the distribution of oil and gas fields in the study area, respectively.

Oil and gas producing intervals within the Wilcox Group occur from the top to the lower portion. The first discovery of the commercial Wilcox oil field was in the Urania Field, whose producing interval is the top of the Wilcox Group. The upper part of the lower Wilcox as well as uppermost part of the Wilcox have produced oil and gas (Shreveport Geological Society, 1945; 1951; 1958; 1961; 1963; 1980). Production from uppermost Wilcox includes the Colgrade, Cross roads, Curry, David Haas, Eola, Epps, Holly Ridge, Joyce, Lake St. John, Little Creek, Rogers, Salt, Selma, Tullos-Urania, West Catahoula Lake, West Searcy, and Zenoria fields (Nelson, 1963) in central Louisiana, and Lockhart Crossing field in south east Louisiana (Self et al., 1986). Within the updip Wilcox trend, the area from La Salle Parish across eastern Louisiana has many stratigraphic traps caused by sandstone pinchouts associated with channel sand deposition (Landes, 1970). At least ten sandstones in the upper part of the Wilcox have been found to be productive in various fields (Landes, 1970). Other examples of sedimentologically controlled oil production around the study area have been documented by Craft (1966) and Galloway (1968).

Appendix 4 summarizes the stratigraphic positions, producing local sand name if available, producing depth of the Wilcox oil and gas reservoirs, and cummulative production of oil and gas in the study area. The amount of produced hydrocarbons from each reservoirs is not available. The lists in Appendix 4 are arranged alphabetically by both fields and parishes.

Oil and Gas Source Rocks

Recent information on oil characterization and source rock-oil correlation (Sassen et al. 1988; Walters and Dusang, 1988; Hanor and Sassen, 1990; Sassen, 1990; Wegner, et al., 1990) have shown that Wilcox oils can be differentiated on the basis of composition from other oils, such as those from the Smackover or Tuscaloosa (Figure 11), and that the Wilcox oil has been generated from Wilcox source rock shales located in south Louisiana where the Wilcox shale has reached a thermally mature stage. Oils within the Wilcox Group, both updip and downdip, have same oil characteristics, which suggesting the same source. Hanor and Sassen (1990) documented not only these organic geochemical findings but also possibility of large scale lateral migration of both hydrocarbons and pore waters.

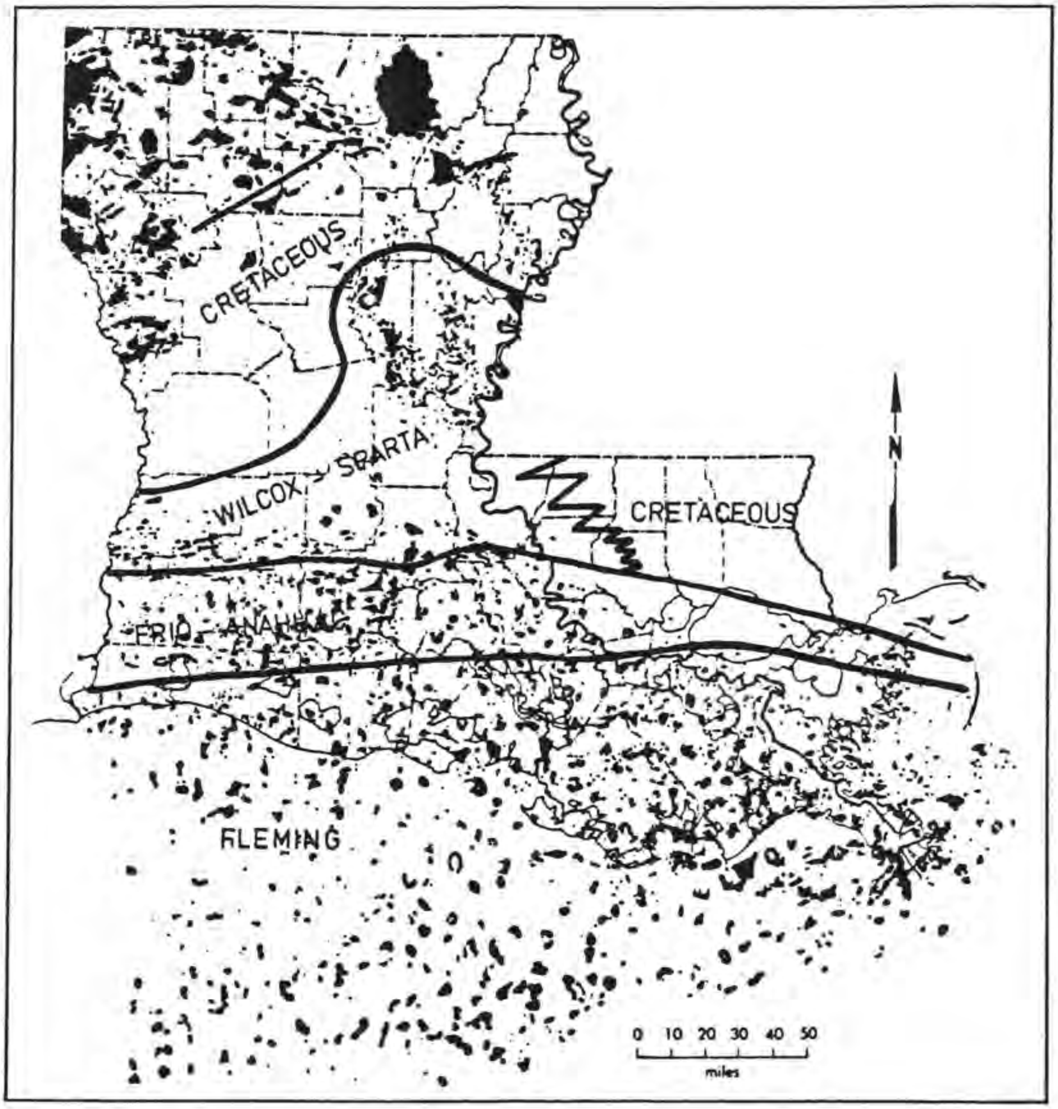

Figure 9. Oil and Gas fields and production trends in Louisiana (oil and gas field map: originally Stanfield et al., 1981, adapted from Kniffen and Hillard,1988; production trend: Landes, 1970).

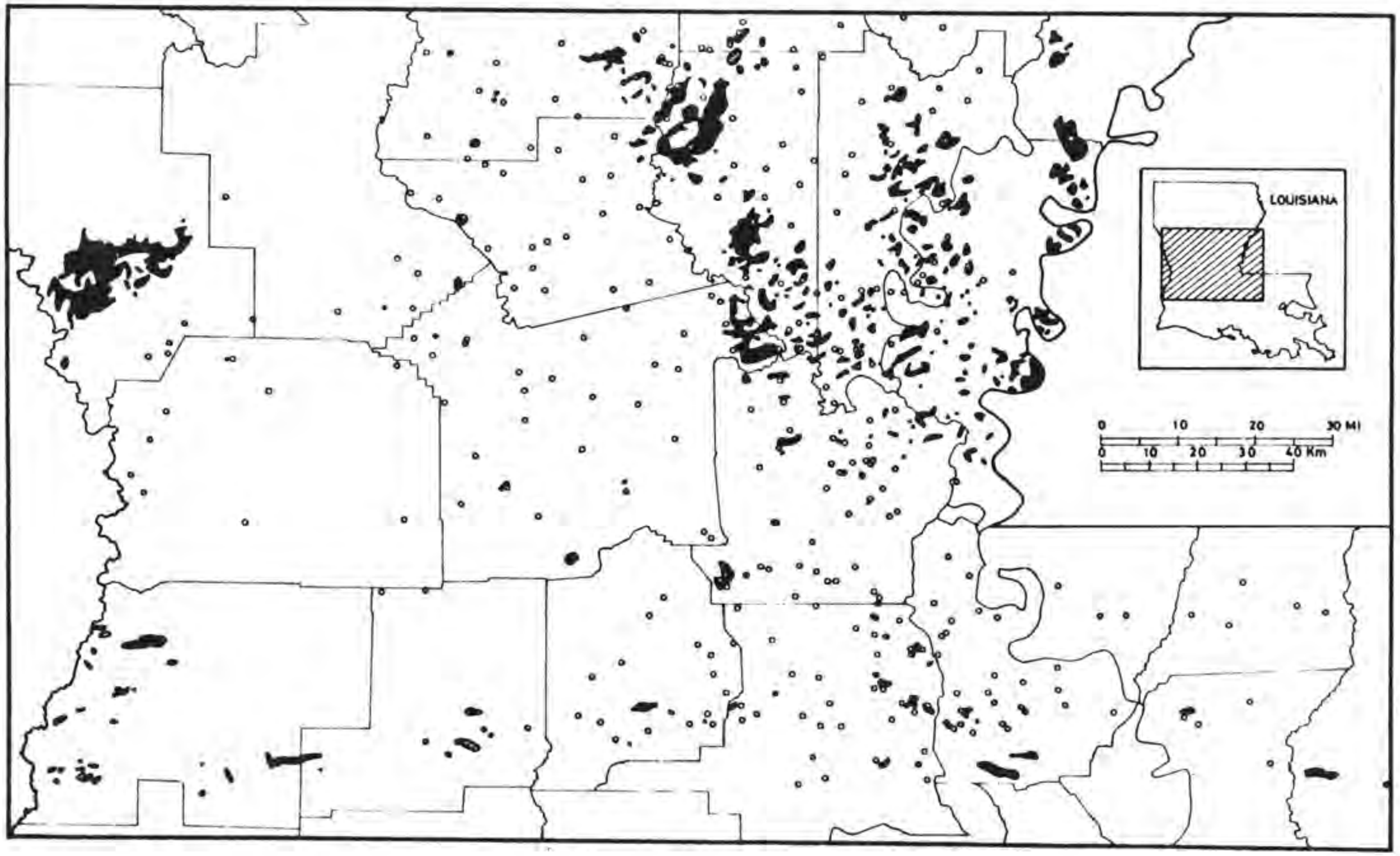

Figure 10. Wilcox oil and gas fields in the study area (black areas) (modified from Lowry et al., 1986). Open circles show location of study wells.

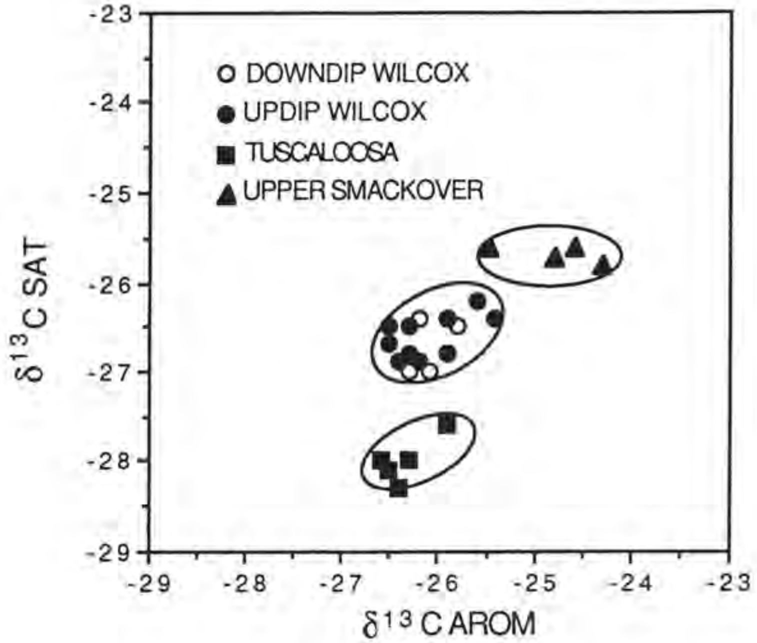

Figure 11. Carbon isotope compositions of several Louisiana crude oils (modified from Sassen et al., 1988).

MATERIALS AND TECHNIQUES

Stratigraphic correlations, sandstone percentages, temperature, pore water salinity, and pressure were determined using 323 well logs (Figure 1; Appendix 3). The reasons for the use of well logs as the primary source of data include their vertical continuity, almost uniform format, ready availability, and broad geographic coverage. The basic log combination available in the study area is SP (called also as spontaneous potential, spontaneous polarization, or self potential) and resistivity.

Basic algorithms for determining fluid properties of sodium chloride solutions have been developed by Bateman and Konen (1977), Bateman (1985) for salinity, and Phillips et al.(1981, 1983) for other fluid properties such as in situ fluid density, viscosity, and thermal conductivity, respectively. Information required for the calculation of pore fluid properties is usually recorded on log headings, however, some parameters are sometimes missing or poorly controlled. In addition because many wells were drilled in 1940's and 50's in northern central Louisiana, some of the parameters required for evaluating fluid properties were not available when these older logs were recorded. Several statistical investigations were carried out as part of this study to overcome these problems. A spreadsheet program which works on a microcomputer was developed using modifications of the above mentioned algorithms (Figure 15; Appendix 1).

Although most of the calculations were done specifically on the Wilcox Group, additional sediment and fluid property calculation were performed on entire available sections of wells on four regional cross sections in order to obtain a general view of the spatial variation of salinity of pore waters in the study area (Figure 12).

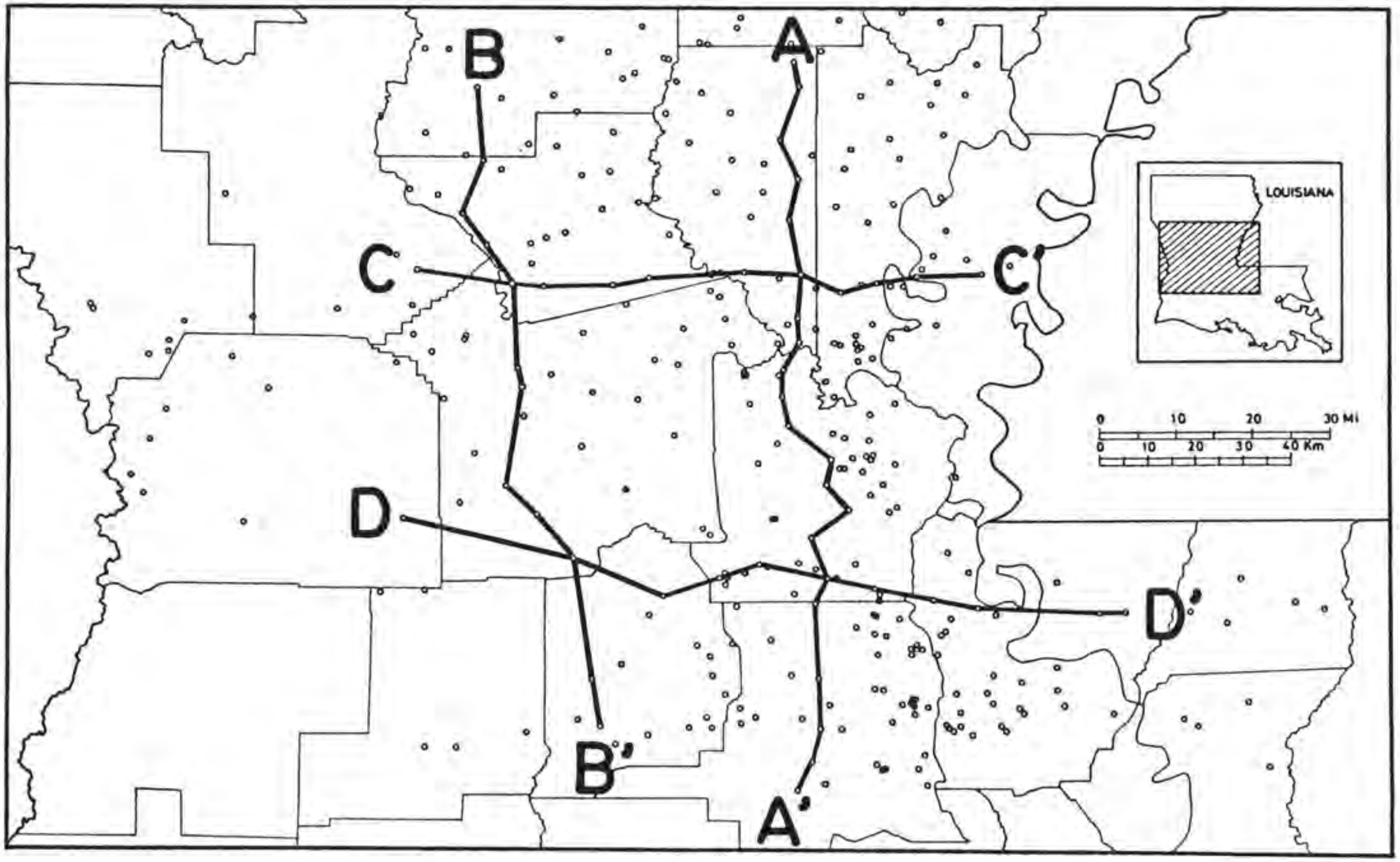

Figure 12. Index map of four regional cross sections.

Log Correlation

The stratigraphically deepest unit considered in this study is the Wilcox Group. Stratigraphically shallower sections will simply be called the post-Wilcox. The Wilcox Group top was picked at the first negative SP deflection, the base was picked essentially at the base of the continuous sandstone section (Figure 5). Figure 30 shows the structural contour map at the top of the Wilcox Group in 1,000 ft contour intervals. Figure 31 shows the isopach map of the Wilcox Group. Correlation of the base of the Big Shale was also attempted for the wells on the four regional cross sections.

Sandstone Percentage from SP Logs

Shale base and clean sand lines were drawn assuming that entire sections consist only of siliciclastic rocks. These lines were drawn as straight as possible with depth without having frequent oblique changes. The sandstone percentage was determined by midpoints between the shale base and clean sand lines. The sandstone percentage was determined within every 100 ft interval for whole sections of the wells on four cross sections subtracting the elevation of the Kelly Bushing (KB) and starting at a datum of mean sea level. Several trials assured that the exact position of the shale base or clean sand line is not so sensitive in sandstone percentage determination for this regional study, because the tangent of the SP curves is usually steep relative to depth. The results are shown graphically on the sections A-A' through D-D' (Figures 32-35).

Because stratigraphic subdivision of the Wilcox Group in the entire study area is difficult, two arbitrary but convenient stratigraphic divisions, one from 0 to 1,000 ft from the top and the other from 0 to 1,000 ft from the base of the Wilcox Group were used. Sandstone percentages of both the upper 1,000 ft and the lower 1,000 ft intervals of the Wilcox Group were determined and plotted on maps individually. When the well did not reach to base of the Wilcox but close to the base, the position of the base of the Wilcox in the well was assumed from adjacent wells and the isopach map of the Wilcox (Figure 31). Those maps give general idea of the areal distribution of sand within the upper and lower Wilcox, although the subdivision does not follow rigorous stratigraphic nomenclature.

Temperature

Measured bottom hole temperature (BHT) data are recorded on most of the log headers. The temperature data were utilized in salinity calculations using SP values recorded under those temperature conditions. In general these temperature values are less than true equilibrated temperatures because of cooling effects by circulating mud. True bottom hole temperature is necessary to calculate in-situ pore fluid properties. Kehle (1971, cited by Jones, 1975) provides an empirically derived temperature correction curve as a function of depth. The temperature correction value, ΔT in °F, is described by the following quadratic equation:

$$\Delta T = -0.265 \left(\frac{D}{1000} - 11.7\right)^2 + 33 \ldots\ldots\ldots\ldots (1)$$

where D is depth below sea level in feet in positive values.

This correction might be the best method applicable in the study area; however, some apparent discontinuities in temperature might occur between different measurement operations (e.g., between run #1 and #2) even after the correction is made because this equation cannot account for individual circulation times and the time after circulation stopped (e.g., Figures 28 and 29).

Pore Fluid Pressure and Geostatic Ratio

Pore fluid pressure is an important parameter in evaluating fluid movement. Five major sources of pressure data are 1) direct measurement by wireline testing or production testing, 2) estimation from drilling mud weight, 3) estimation from shale resistivity, 4) estimation from shale transit time, or 5) estimation from shale density of cuttings or shale density on density logs. In the Gulf Coast, with limited number of logging tools, pore pressure is often estimated from shale resistivity by the methods of George (1965), Ham (1967), Hottman and Johnson (1965), McGregor (1965), or from mud weight. Pore fluid pressure from mud weight is given by:

$$\text{Pressure}_{[\text{MUD}]} = \text{Mud Weight} \times 0.052 \times \text{Depth} \; . \; . \; . \; . \; . \; .(2)$$

where pressure is in psi; mud weight is in lb/gal; the coefficient 0.052 is in in^2ft; and depth is in feet. The resulting pore pressure from the mud weight method provides slightly higher values than actual pore pressures as a result of the usual practice of weighting mud to avoid underbalanced conditions. In studies in south Louisiana, so called George graph (George, 1965) has been provided a good approximation of pore fluid pressure or geostatic ratio. For convenience, simple equations have been derived here with some assumptions (Figure 13; see Appendix 2

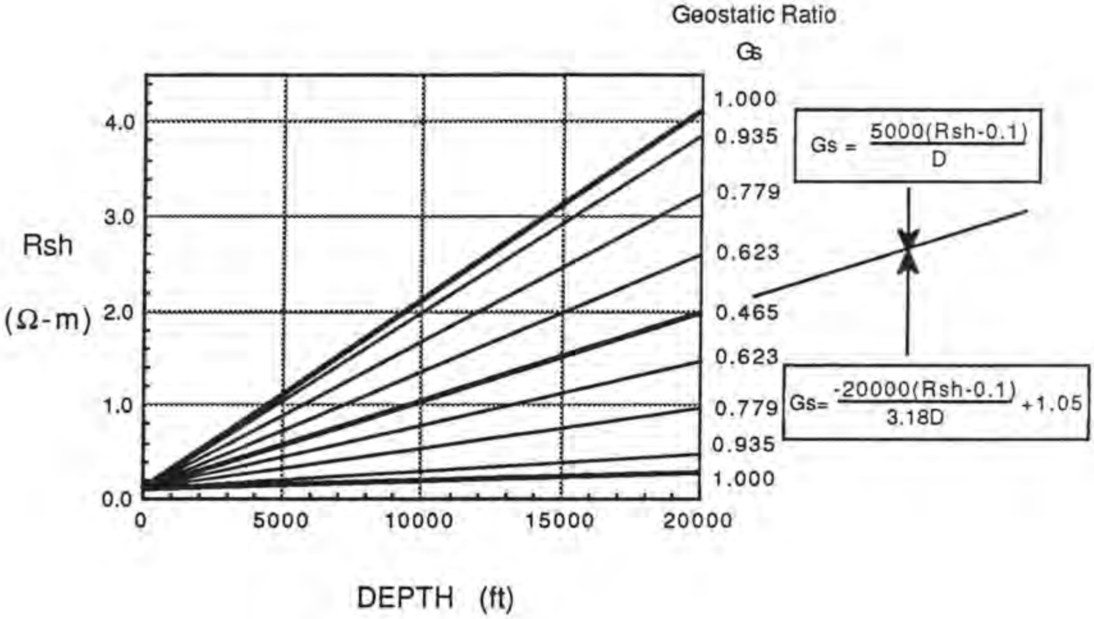

Figure 13. Reconstructed George graph for estimation of pore fluid pressure from shale resistivity (see derivation in Appendix 2)

for derivation). If the test equation, 5000*(Rsh-0.1)/D -0.465, yields a positive value, equation (3) was applied; if the test equation yields a negative value, then equation (4) was applied, respectively;

$$Gs = \frac{5000(Rsh-0.1)}{D} \quad \ldots\ldots\ldots\ldots\ldots\ldots \text{(3)}$$

$$Gs = \frac{-20000(Rsh-0.1)}{3.18D} + 1.05 \quad \ldots\ldots\ldots\ldots \text{(4)}$$

where Gs is the geostatic ratio (dimensionless); Rsh is shale resistivity in Ω-m. When combinations of shale resistivity values and depth were out of range on the George graph, in other words, the calculated geostatic ratio is more than 1.0, pore pressure and the geostatic ratios were estimated from mud weight profiles instead.

Salinity Estimation from SP Logs

SP Log

SP logs are of primary importance in this study because they are the primary source of information on salinity and salinity-dependent pore fluid properties. SP logs are the oldest downhole measurement and have been used most extensively among the numerous logging tools. Allaud and Martin (1977) provide an excellent review of the development of logging devices and log interpretation. There are two ways of utilizing SP logs: in non-quantitative and quantitative applications. Non-quantitative uses includes permeable/impermeable bed detection, sand/shale distinction (although a contact logging device is more preferable for this purpose), gas/oil/water contact detection, correlation, and depositional environment interpretation. These uses depend on the shapes of the SP curves rather than their absolute deflection. Sedden (1984) discussed on the validity of non-quantitative use of SP logs. The quantitative use includes estimation of salinity of pore fluid and the estimation of shale volume in permeable beds. Several problems with the quantitative use of SP logs, particularly old logs, have been addressed. For example, possible errors in SP logs of pre-1955 vintage have been attributed to the insufficient impedance and stability of the voltmeter (Hallenburg, 1984).

A number of theoretical discussions have been made on the SP response. There is general agreement that the SP curve consists of two major components: the electrochemical and electrofiltration (or streaming) components. The electrofiltration component is usually negligible. However, this component must be considered on the calculation of pore water resistivity (Hallenburg, 1984). This study did not take into account for the electrofiltration potential because of unavailability of suitable sets of Rt-Rxo data.

The electrochemical potential is of primary importance in salinity calculation. The primary source of the electrochemical component is formed by different ionic mobilities when two solutions having different ion activities are in contact and the system tries to restore equilibrium through ionic diffusion. The conventional calculation procedure of pore water salinity from SP logs can be expressed as follows (Doll, 1948; Bateman, 1985):

$$Ec = SSP = -Kc \log \frac{a_w}{a_{mf}} = -Kc \log \frac{Rmfe}{Rwe} \approx -Kc \log \frac{Rmf}{Rw} \text{ ......(5)}$$

where: Ec = potential of the cell in millivolts

SSP = static SP in millivolts

a_w = activity of the pore water

a_{mf} = activity of the mud filtrate

$K = 61 + 0.133T$ or $70.7(460 + T)/537$

T = formation temperature in °F

Rmf = mud filtrate resistivity at formation temperature in Ω-m

Rw = pore water resistivity at formation temperature in Ω-m

Small letter e refers to effective or equivalent. An algorithm relating and Rwe and Rmfe is shown in Figure 15. SP readings picked from well logs for salinity calculations will be called simply SP deflection later on, which is assumed to be close to SSP. The recorded SP deflection is generally smaller than the true SSP, particularly in thin and highly resistive beds.

In order to compare pore water, mud, and mud filtrate resistivities conversion of them to a relevance temperature is necessary. A widely used relationship of between fluid resistivity and temperature for sodium chloride solution is given by the following equation, which first appeared in Schlumberger Chartbook (Hilchie, 1984), :

$$R(T) = R1 \frac{T1+6.77}{T+6.77} \quad \text{..........} \quad (6)$$

where R(T) is fluid resistivity measured at temperature T; R1 is the fluid resistivity at the desired temperature T1. At 75°F, resistivities of water, mud, and mud filtrate are designated by Rw75, Rm75, and Rmf75, respectively. Another approximation of resistivity-temperature relation has been proposed by Hilchie (1984):

$$R(T) = R1 \frac{T1+X}{T+X} \quad \text{..........} \quad (7)$$

where $X = 10^{(-0.340396 \log R1 + 0.641427)}$ .... (8)

The second method provides a more accurate approximation of the resistivity-temperature chart on Schlumberger's chartbook, particularly at high resistivity (low concentration of electrolyte) and high temperature conditions. Because the two methods give little difference over most of resistivity range encountered in this study, however, the former conventional method was used.

When fluids are sodium chloride solutions, the relation between salinity and resistivity (Bateman, 1985) can be expressed by:

$$X = \frac{3.562 - \log(Rw75 - 0.0123)}{0.995} \quad \text{..........} \quad (9)$$

$$\text{ppm (NaCl)} = 10^{x} \quad \text{..........} \quad (10)$$

In central Louisiana the resistivity of pore water of the Wilcox reservoirs (Hawkins et al, 1963a) shows that the assumption that the pore waters are essentially sodium chloride solution is appropriate (Figure 14; Table 1).

As a verification of the SP derived salinity, other methods of estimating salinity or Rw are also available. Logan (1961) tested several existing methods of estimating of electrical conductivity from chemical analysis of solution statistically and proposed a new empirical method. His work includes an evaluation of Dunlap and Hawthorne (1951). Desai and Moore (1969) also described an alternative method for estimating the equivalent concentration of sodium chloride solution from chemical analysis.

The overall salinity calculation algorithm based on Bateman (1985) and employed in this study is summarized in Figure 15. The sensitivity analysis on the salinity calculation algorithm of Bateman (1985) was performed (Figure 16) at approximately 100

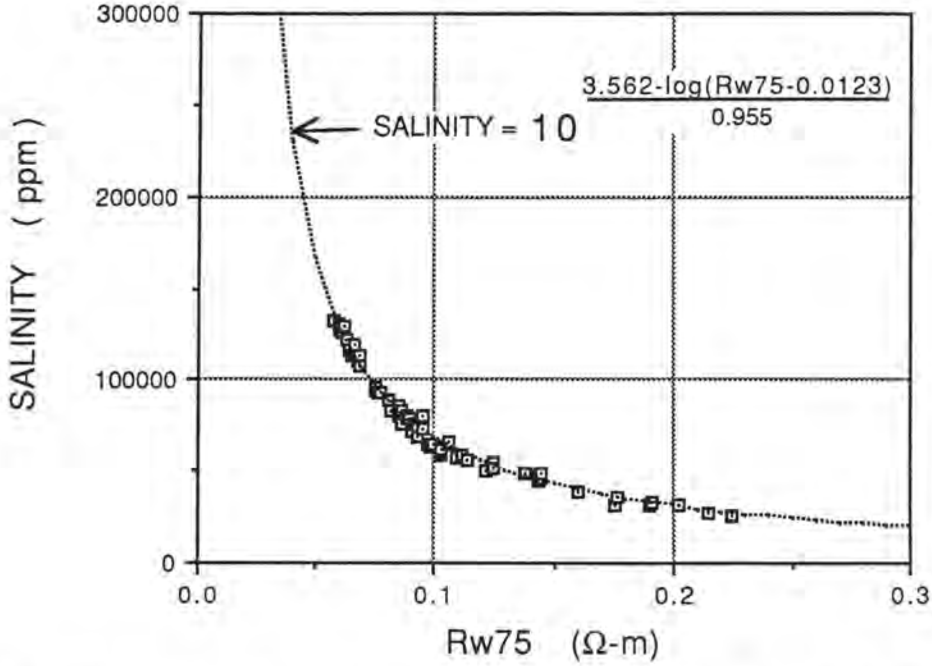

Figure 14. Comparison between fluid resistivity pore fluid from Wilcox reservoirs and sodium chloride solutions (water analysis data from Hawkins et al., 1963a; fluid resistivity equation for sodium chloride solution from Bateman, 1985).

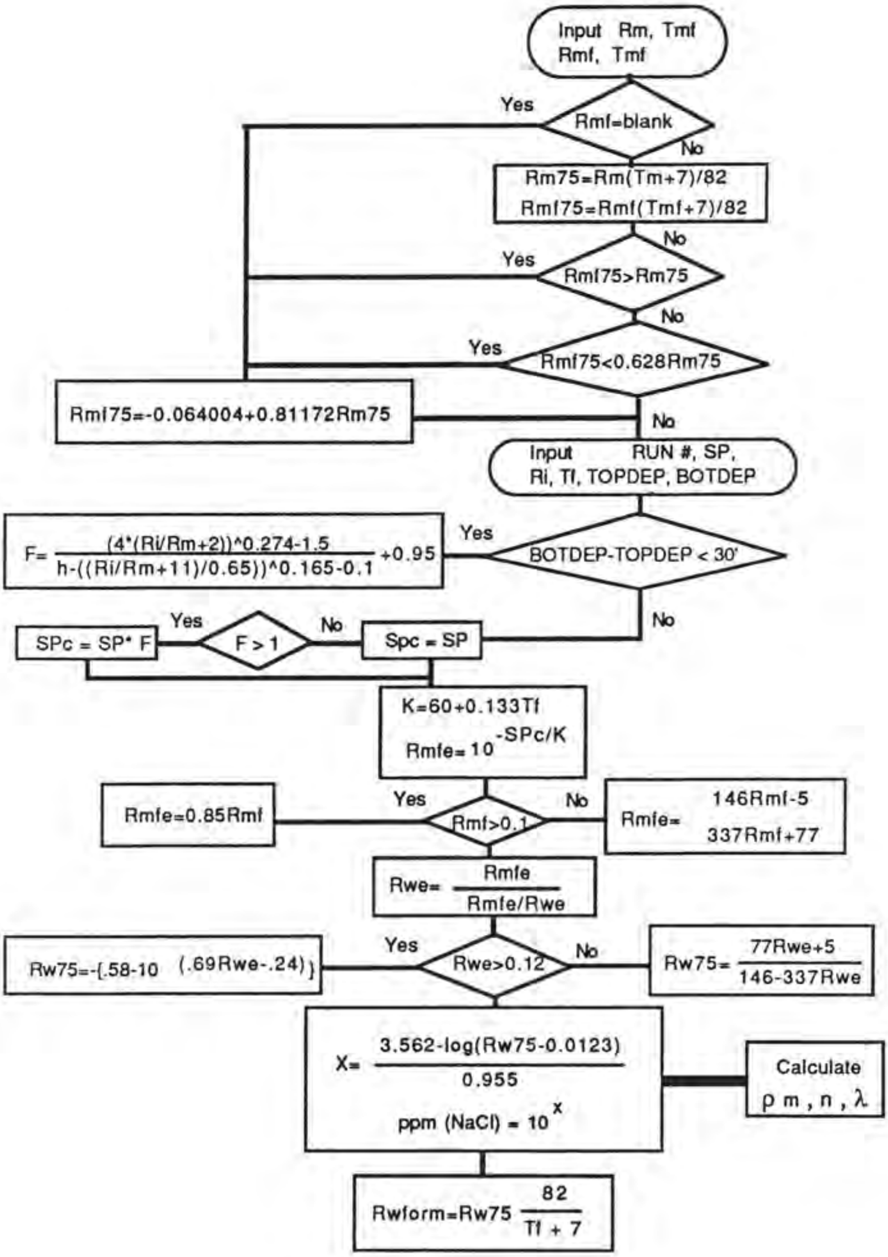

Figure 15. Salinity calculation flow chart (added to Bateman, 1985).

millivolts SP deflection, which is very common within the total SP deflection range, using three parameters: SP deflection, bottom hole temperature, and mud filtrate resistivity. The measured temperature of mud filtrate resistivity can be substituted for mud filtrate resistivity because one is reciprocal of the other (Eqn. 6). The examined range of sensitivity was ± 25%. Calculated salinity is most sensitive to the SP deflection. Bottom hole temperature is least critical of the three. However, an error in mud and mud filtrate resistivity measurement may sometimes exceed this sensitivity range due to inadequate mud samples and/or poorly controlled measurements. Typographical mistakes or information recorded on a wrong column or in wrong order on the log header, as was encountered in several wells in this study, can result in errors of serious magnitude.

An entire review of SP quality is beyond the scope of this study. However, it should be noted that several unavoidable factors can affect SP quality significantly. Several articles have addressed on the factors which affect SP quality (Bateman, 1985; Hallenburg, 1984; Johnson, 1970; Pirson, 1963; Roy and Saha, 1975; Segesman, 1959; Tabanou, 1988). For instance, factors affecting the electrochemical potential include chemical and mineralogical composition of sandstones, the composition and concentration of salts in solution filling the pore space, degree of saturation with electrolyte, density of the rock, grain size of the rock, cation-exchange capacity (CEC) of the shale, and salinity of the mud (Hallenburg, 1984).

Practical problems in determining shale base lines in this study arose when logging operations were carried out only within the sandstone dominant intervals or over very short depth intervals. Other problems encountered included obvious shale baseline shifts (Figure 17 A-D) and marked oblique shale baselines (Figure 17 E). These shifts have been explained by the temperature shifts in the hole and the change of electrode potential by irregular tool movement (Hallenburg, 1971; 1984), change in membrane properties in shale and shaly sands (Smits, 1968), and large variations of salinity of pore fluids (Pied, 1966). However, the cause-and-effect in specific cases and the quantitative treatment are uncertain.

Another practical problem is uncertainty of applicability of the above mentioned conventional salinity calculation procedures in geopressured reservoirs. Salinity estimations using the conventional method has a poor correlation against measured salinities taken from reservoirs under geopressured conditions. Some correction methods have been proposed (Dunlap and Dorfman,1981; Morton et al., 1981; Silva and Bassiouni, 1981; 1983); however, no acceptable method has yet been established.

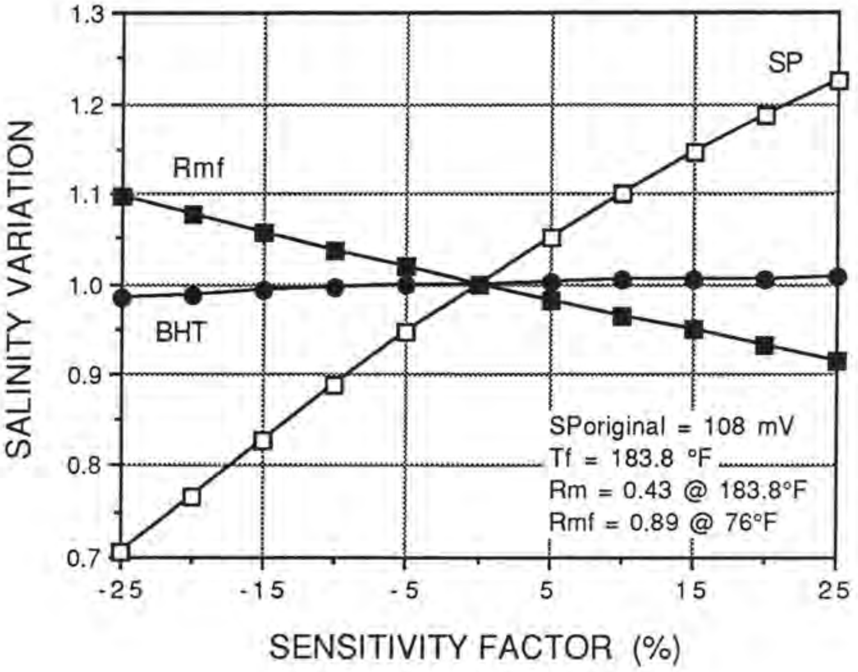

Figure 16. Sensitivity analysis of salinity calculations from SP response.

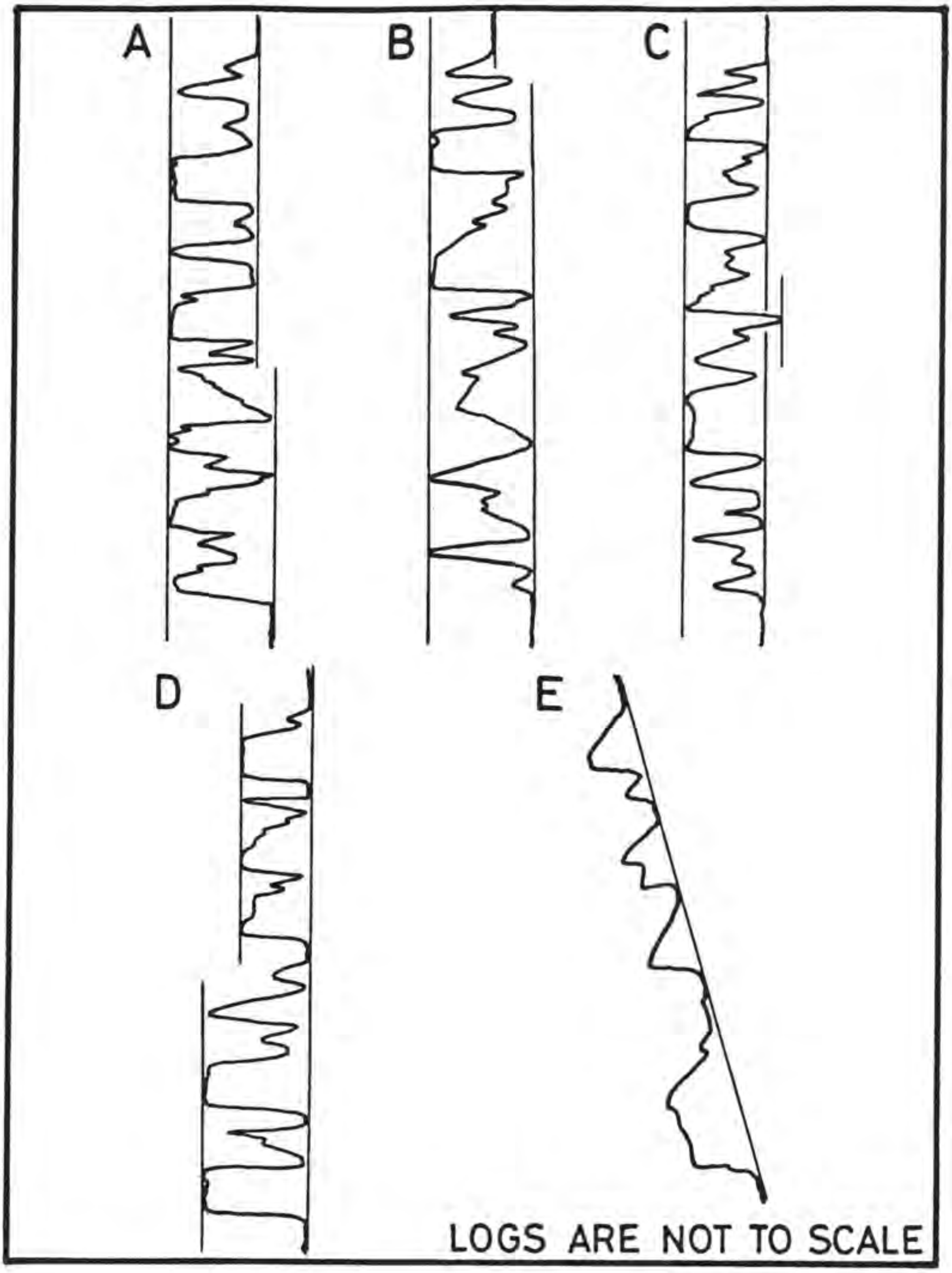

Figure 17. Schematic patterns of SP line shift.

Parameters Required for Salinity Estimation from SP Logs

Parameters required to calculate pore fluid salinity are SP deflection, mud filtrate resistivity and its measured temperature, and the temperature at which the SP was recorded. However, no Rmf measurement data are available for wells drilled before around 1957. In addition mud data or temperature data are sometimes either not recorded on well log headings or poor of quality. Hence, a statistical investigation was made as part of this study to compensate for the lack of required calculation parameters on some of the logs.

SP Deflection

As seen in previous section the SP deflection is a sensitive parameter for salinity calculations. Responses of a 10 percent difference of SP deflection will result in a 10 percent difference in calculated salinity (Figure 16). Hence, we have to be careful in drawing shale base lines and even in changing of the actual grid width of the SP track due to expansion or shrinkage of the paper.

One of the important correction factors is the bed thickness correction. Original work by Doll (1948) and revised methods by Seggesman (1962) provide correction in terms of bed thickness. Atlas Wireline Services (1985) provide an equation accompanied with a slightly different chart for bed thickness correction derived from Schlumberger's chart created by Doll and Seggesman. However, we have no data to evaluate the original work done by Doll (Tabanon et al., 1988). In this study the equation in Atlas Wireline Services (1985) was applied. However, due to a nature of this equation, even a negative correction will be made in some range of data sets (Figure 18). To avoid this negative correction, additional checking steps were added to the salinity calculation algorithm (Figure 15; Appendix 1).

To further check SP quality, SP shape was classified into three types, cylindrical, funnel, and bell, besides a qualitative ranking designated by A through C. Rank A refers to a SP deflection in at least 30 ft thickness of sand with no distinct shale intercalations. Rank B refers to SP deflections in more than 30 ft thickness with distinct shale intercalation, or SP deflection having less than 30 ft but more than 10 ft of sand without distinct shale intercalations. Rank C refers to SP deflections in sand thickness between 30 and 10 ft but with an unclear upper or lower boundary. All the results of the salinity calculations were plotted on a graph for each well.

In reading SP deflection, it has been a problem how often and where to pick the points. The working principle applied here was simply to read wherever the sandstones whose SP were well deflected, and clean sand lines ran approximately parallel to the shale base lines. No further rigorous definition of the criteria for selection of sandstone points was made.

Bottom Hole Temperature

Figures 38 and 39 are a plot of 617 measured values of bottom hole temperatures from 301 wells out of the 323 wells used in this study. Figure 38 represents the data of eleven northern parishes. Figure 39 represents the data of eight southern parishes. Temperatures were estimated using these figures when measurements were not available on the well log headings. As discussed in the preceeding section, bottom hole temperature is least sensitive among the three parameters tested for effects on calculated salinity from SP. As a result the estimated temperature from Figures 38 and 39 gives an acceptable approximation.

$$F=\left\{\frac{((4{*}(Ri/Rm+2))\wedge 0.274)-1.5}{(h-((Ri/Rm+11)/0.65))\wedge 0.165)-0.1}\right\}+0.95$$

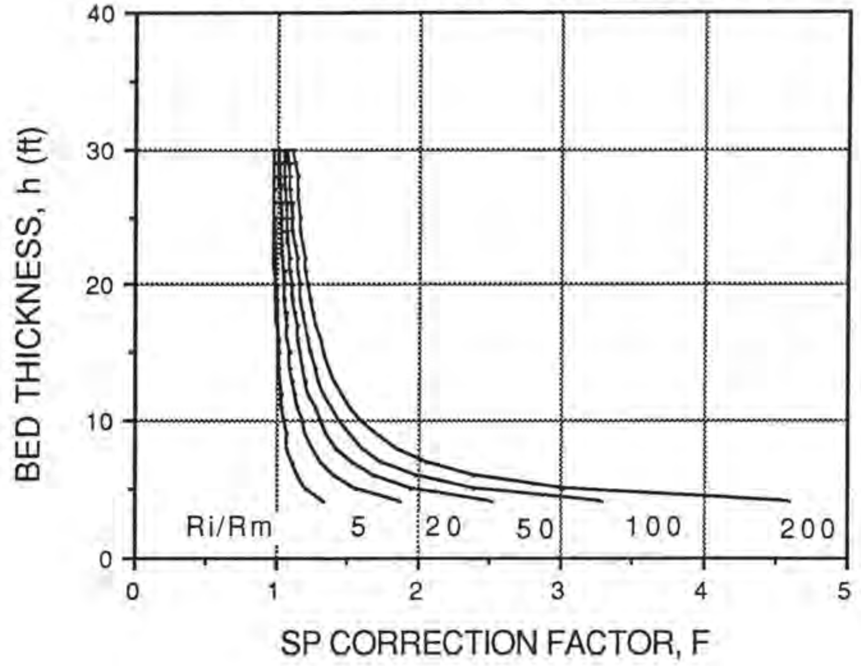

Figure 18. SP bed thickness correction (equation from Atlas Wireline Service, 1985).

Rmf Estimation

Rmf has been measured since approximately 1957. Because many wells in the study area were drilled before this year, a statistical relation of Rm versus Rmf was determined as part of this study. More than 400 paired values of Rm and Rmf recorded on log headings were taken from four townships. To examine north-south geographic effects, four townships were chosen in study as shown in Figure 19 and Table 2. In addition, the dependence of Rm-Rmf relations on mud weight and year of measurement were also investigated.

Table 2. List of Rm-Rmf relation survey.

Township	Parish	No. of wells checked	No. of data (w/ Rmf)	No. of erroneous data
T7NR3E	La Salle	416	214	8
T4NR4E	Avoyelles	159	139	3
T3NR4E	Avoyelles	33	33	2
T4SR4E	St. Landry	91	65	10
Total		699	451	23

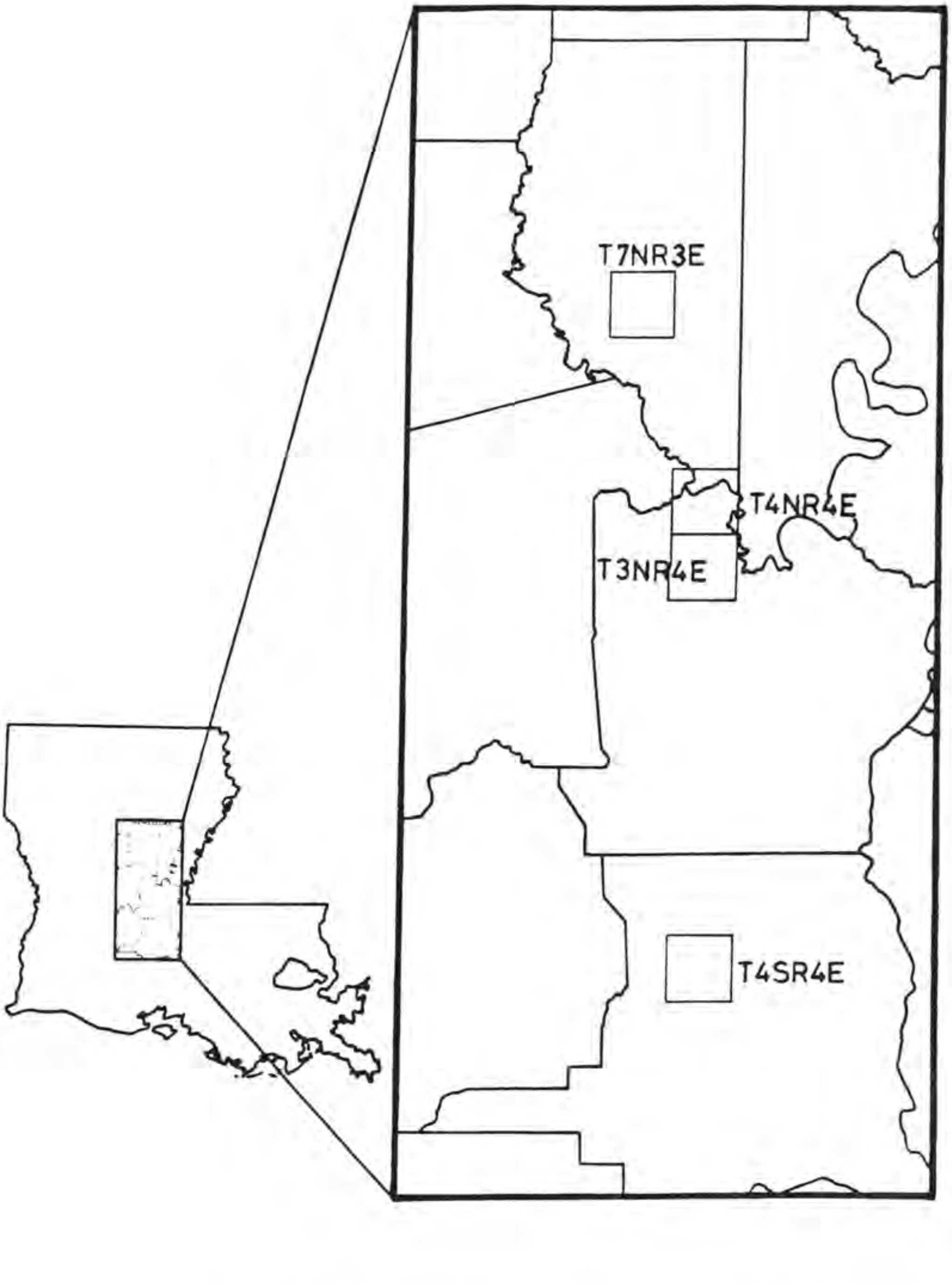

Figure 19. Location of four townships selected for mud properties investigation.

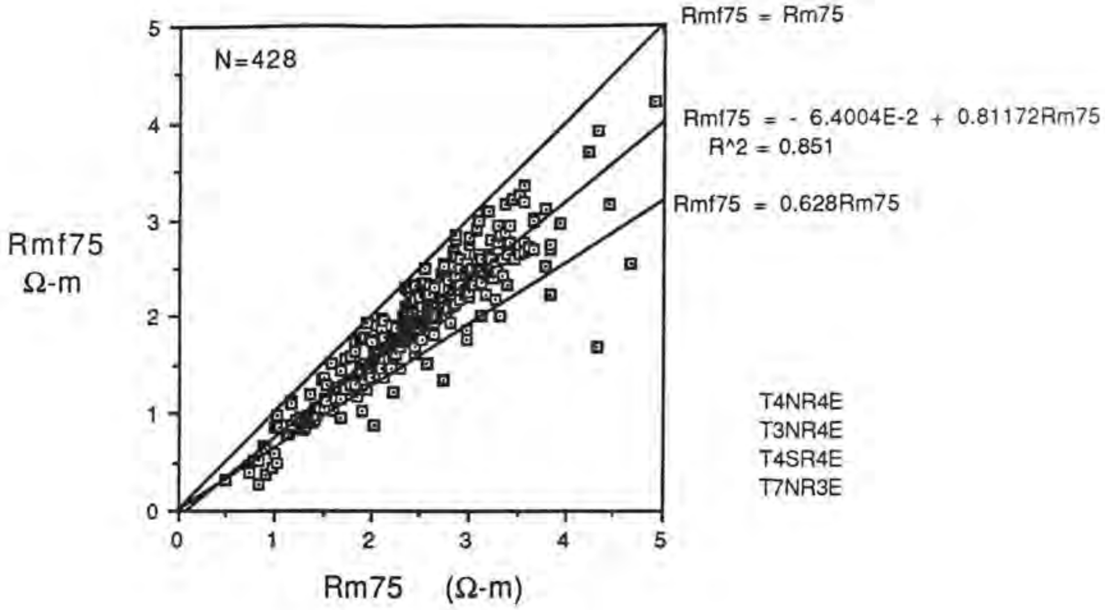

Figure 20. Relationship of mud and mud filtrate resistivity at 75°F in the four study townships.

Approximately a half of wells in T7N R3E do not have Rmf data because these wells were drilled before 1957. For the purpose of comparison, each measurement was converted to values at 75°F. The erroneous data in Table 2 refers to data that have higher Rmf75 values than the corresponding Rm75. These erroneous values were eliminated prior to the further data processing. The reasons of the erroneous mud data presumably include typographical mistakes and inadequate mud sampling, for example, mud taken from mud pit instead of the flowline. It is likely that sudden changes of log heading format and inappropriate format of the headings were responsible for some of the erroneous data.

As shown in Figure 20, Rmf75 has a linear relation with Rm75, so an expression of the form $Rmf = aRm+b$ is possible, where a and b are constants. The intercept b is close to zero, and the slope a varies from 0.76 to 0.86 on plots for each of the four parishes. There is no clear north-south trend. The overall Rm-Rmf relation for 428 (451 minus erroneous 23) data is given by,

$$Rmf75 = -0.6400E\text{-}2 + 0.81172Rm75 \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (11)$$

There are some low Rmf75 values compared to the Rm75 counterparts. The lower five percent of the Rmf75/Rm75 ratios, with the Rmf75 approximately less than 0.628Rm75, are considered to be errornous. The merged 428 data were then divided into four groups by mud weight, ρm ($\rho m < 9.5$ and $\rho m \geq 9.5$ lb/gal) and by recorded year (1957-1974 and 1975-1990) to examine further the cause of variations (Figure 21a-d). If we can assume there is a definite Rm-Rmf relationship, it seems we can relate the deviations to possible causes although it is not possible to conclude a single cause of the deviations. For example, larger deviations of the Rm-Rmf relation of lower weight muds (Figure 21a) can be attributed to errors in measurements as a result of the less conductive nature of mud and mud filtrate. Large deviations of Rm-Rmf relationship with in the measurements of 1975 through 1990 can be attributed to either use of wide variety of different kind of muds or errors in measurements.

Williams and Dunlap (1984) noted that Rmf and Rm values recorded on log headings are sometimes inaccurate compared to daily measurements of Rmf and Rm. Additional causes and effects of some erroneous fluid resistivity measurements have been discussed by Moore and Kaufman (1981).

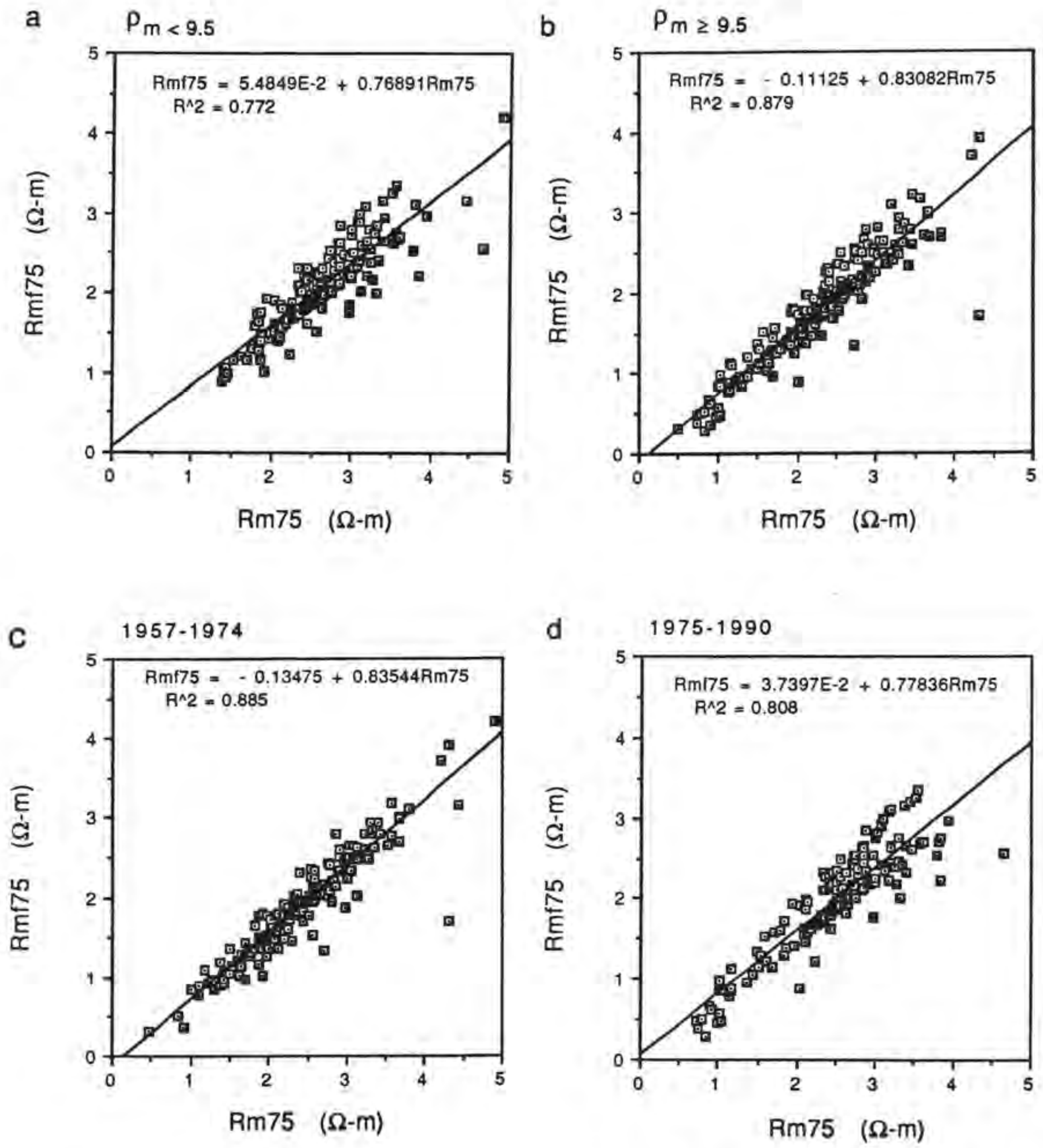

Figure 21. Mud - mud filtrate resistivity relationship dependence on mud weight and recorded year (A: mud weight less than 9.5 lb/gal, B: mud weight recorded between 1975 and 1990).

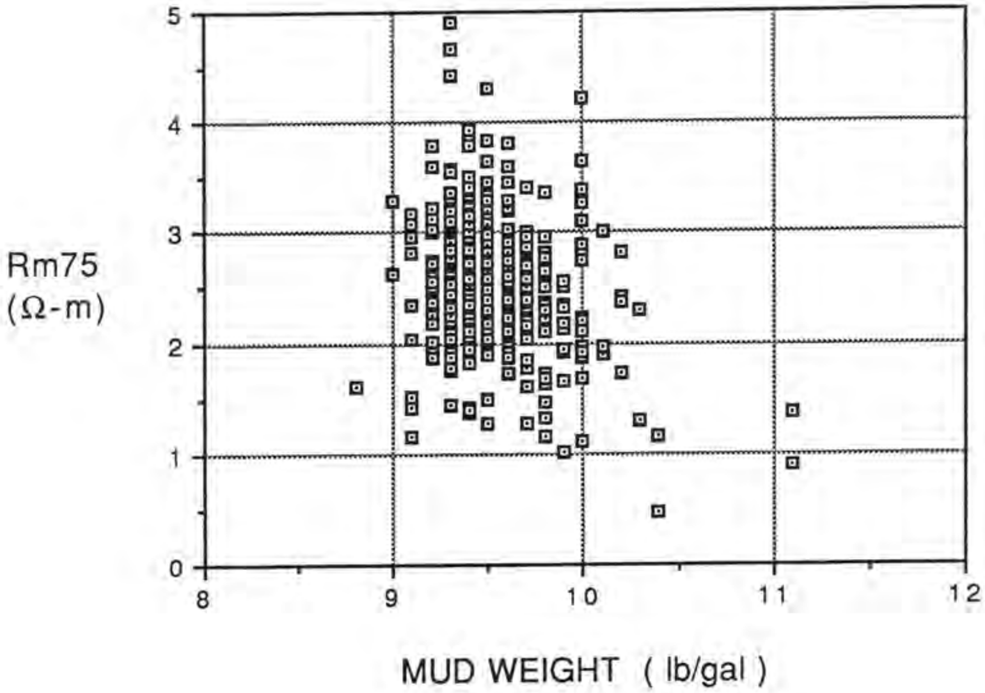

Figure 22. Relationship of mud weight and mud resistivity.

Other methods for estimating Rmf from empirical Rm-Rmf relations have been reported. One uses mud weight, ρm, and Rm (Lowe and Dunlap, 1986), another uses Rm and a coefficient related to ρm (Overton and Lipton, 1958), and both yield similar values of Rmf in the overlapping range. However, both have limited range of applicability, and the Rm and ρm relation has only a weak correlation in this study area (Figure 22). Hence these methods are thought to be inappropriate in this area.

Density and Viscosity Calculations

In situ pore fluid density, viscosity, and thermal conductivity were calculated from algorithms of Phillips et al. (1981, 1983) with several modifications. All the calculated results of were plotted against depth individually for each well.

Density

An equation in Phillipps et al. (1983) was used to calculate in situ fluid density. They derived fluid density equation empirically. The general form of the fluid density equation is

$$d = A + Bx + C x^2 + Dx^3 \qquad (12)$$

where d is density in g/cm^3, x is a function of molal concentration of solution, temperature is in °C, and pressure is in MPa. A through D are constants. The same equation in Phillips et al. (1981) has a typographical mistake in the value C_1 (Phillips,1990, written communication). The effect pressure on the density equation is minimal (Table 3, Figure 23), so pressure value was fixed at 1 bar (0.1MPa) in these calculations although maximum pressure within the Wilcox Group is approximately 1000 bars (100 MPa). As a result the calculated in situ density is a function of temperature and salinity. This equation is quite useful because of its wide application range, i.e., 0 to 350 °C and 0 to 5 molal. As noted by Hanor et al. (1986); however, serious deviations occur at low temperatures and salinities compared to actual water density (Figure 24).

Table 3. Sensitivity in in situ fluid density calculations using the Phillips et al. (1983) equation.

MOLALITY		PRESSURE			TEMPERATURE	
	1bar 25°C		1 molal 25°C	1 molal 100°C	Temp.	1 molal 1 bar
mol	d	MPa	d	d	°C	d
0	1.0128	0.1	1.0388	0.9866	0	1.0548
0.5	1.0261	1	1.0389	0.9867	10	1.0484
1	1.0389	10	1.0394	0.9873	25	1.0389
1.5	1.0512	20	1.0399	0.9880	50	1.0224
2	1.0634	30	1.0405	0.9886	75	1.0052
2.5	1.0757	40	1.0410	0.9893	100	0.9867
3	1.0880	50	1.0416	0.9900	125	0.9666
3.5	1.1008	60	1.0421	0.9906	150	0.9447
4	1.1141	70	1.0427	0.9913	175	0.9204
4.5	1.1280	80	1.0432	0.9919	200	0.8936
5	1.1429	90	1.0438	0.9926		
		100	1.0443	0.9933		
		150	1.0471	0.9965		
		200	1.0498	0.9997		

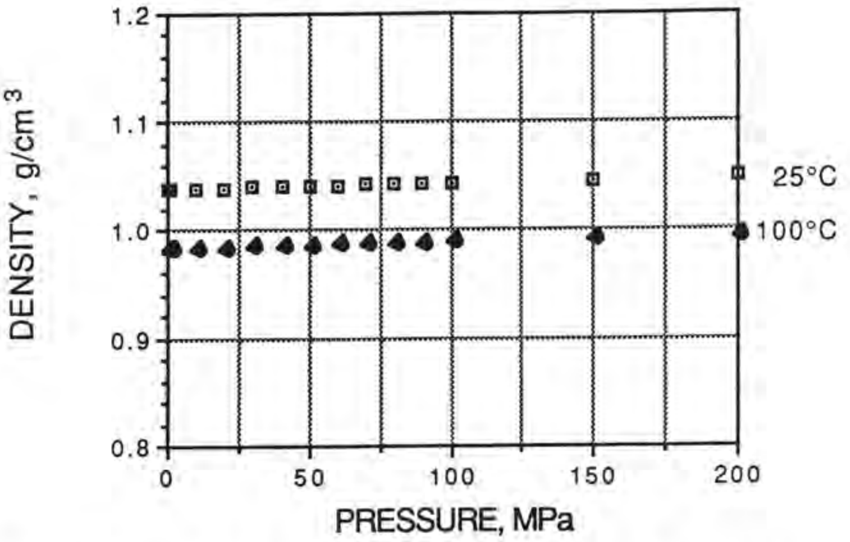

Figure 23. Effect of pressure on in-situ fluid density calculation (equation from Phillips et al., 1983).

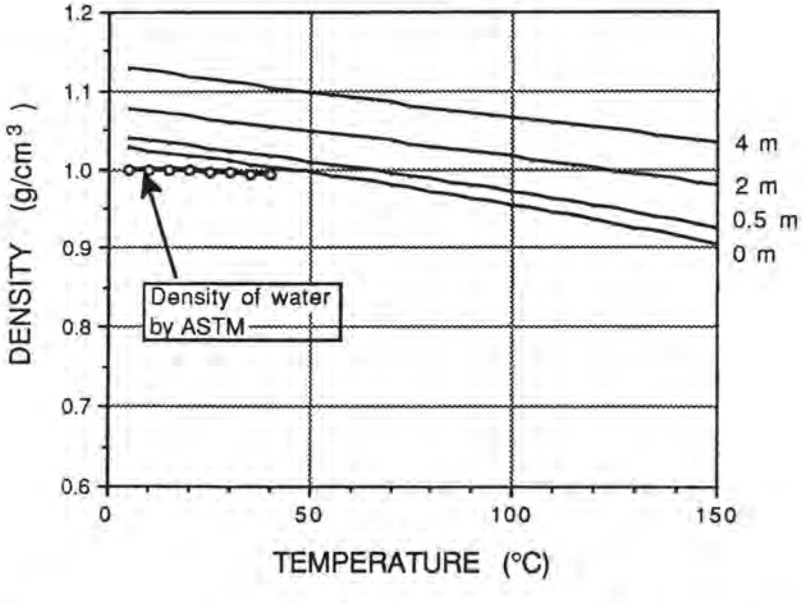

Figure 24. Comparison between water density and calculated densities of sodium chloride solutions data from (Hamilton and Dow Chemical Company, 1983; equation from Phillips et al.,1981).

Viscosity

The method used in Phillips et al. (1981) was used to calculate viscosity of pore fluids. Their equation gives a correlation equation of sodium chloride fluid viscosity, n, normalized to the viscosity of pure water, nw. The general form of the equation is:

$$n/nw = 1 + am + bm^2 + cm^3 + dT(1-e^{km}) \quad \ldots\ldots\ldots (13)$$

where a, b, c, d and k are constants; m is molal concentration of sodium chloride solution; and T is temperature in °C.

The viscosity equation for pure water developed by Watson et al. (1980) and used in Phillips et al. (1981) is so complex that it is not suitable for practical use. Hence an alternative approximation of water viscosity was derived from data of Vargaftik (1975). Because effect of pressure on viscosity is also minimal (Figure 25), the viscosity of pure water, nw, can be represented by a polynominal regression as a function of temperature (Figure 26):

$$nw = 1.7392 - (4.9112E\text{-}2)T + (7.5121E\text{-}4)T^2 - (6.1993E\text{-}6)T^3 + (2.5565E\text{-}8)T^4 - (4.1092E\text{-}11)T^5 \quad \ldots\ldots\ldots (14)$$

where T is temperature in °C.

Results using this equation give an acceptable match with Phillips et al. (1981), particularly in low temperatures and salinities, and slight deviations at high temperatures and

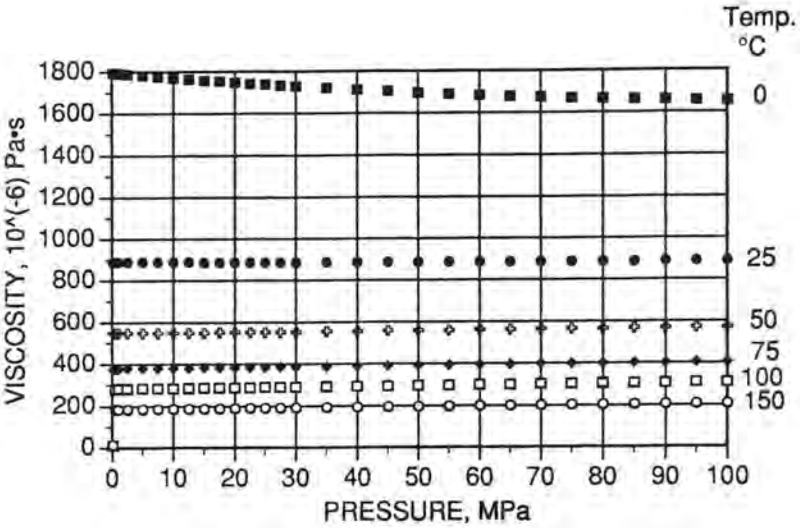

Figure 25. Effect of pressure on viscosity of sodium chloride solutions (equation from Phillips et al.,1981).

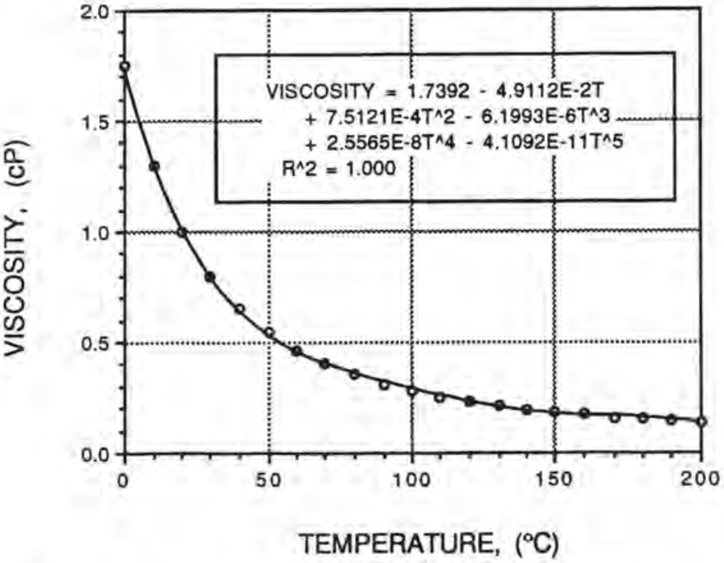

Figure 26. Water viscosity approximation by polynomial curve fitting (data from Vargaftik, 1975).

salinities. For example, there is a 9.3 percent maximum difference between the two at 200°C and 4 molal sodium chloride (Table 3).

Validation Limits of Calculated Data

Validity of the calculation results are totally dependent on SP and other parameters available on the log headings. Comparison with measured water salinity demonstrates that the calculated salinities are valid to the depths of at least 6000 ft. Because deep sections were drilled out within one casing schedule in many wells, the parameters used in the salinity calculations were valid up to far deeper than 6000 ft. Since most water production associated with hydrocarbon production or bottom hole testing is limited to shallower sections, verification with directly measured data is not possible at this moment.

As seen in the section on sensitivity analysis of SP derived salinity calculation, miscellaneous shale baseline shifts are usually within ±10%. A far more serious error in this calculation is brought by mostly man-made mistakes concerning calculation parameters.

Pore fluid properties calculated from the salinity results also be affected by calculation parameters such as bottom hole temperature and its correction method. Reliability of the recorded bottom hole temperature is of importance in quantitative interpretations of fluid density and viscosity, particularly when stepwise temperature measurements were performed over the interval of interest. Rigorous quantitative evaluation on in-situ pore fluid density and viscosity is not available in this study. A more reliable equation for in-situ density calculation is desirable to provide better values at low temperatures and salinities.

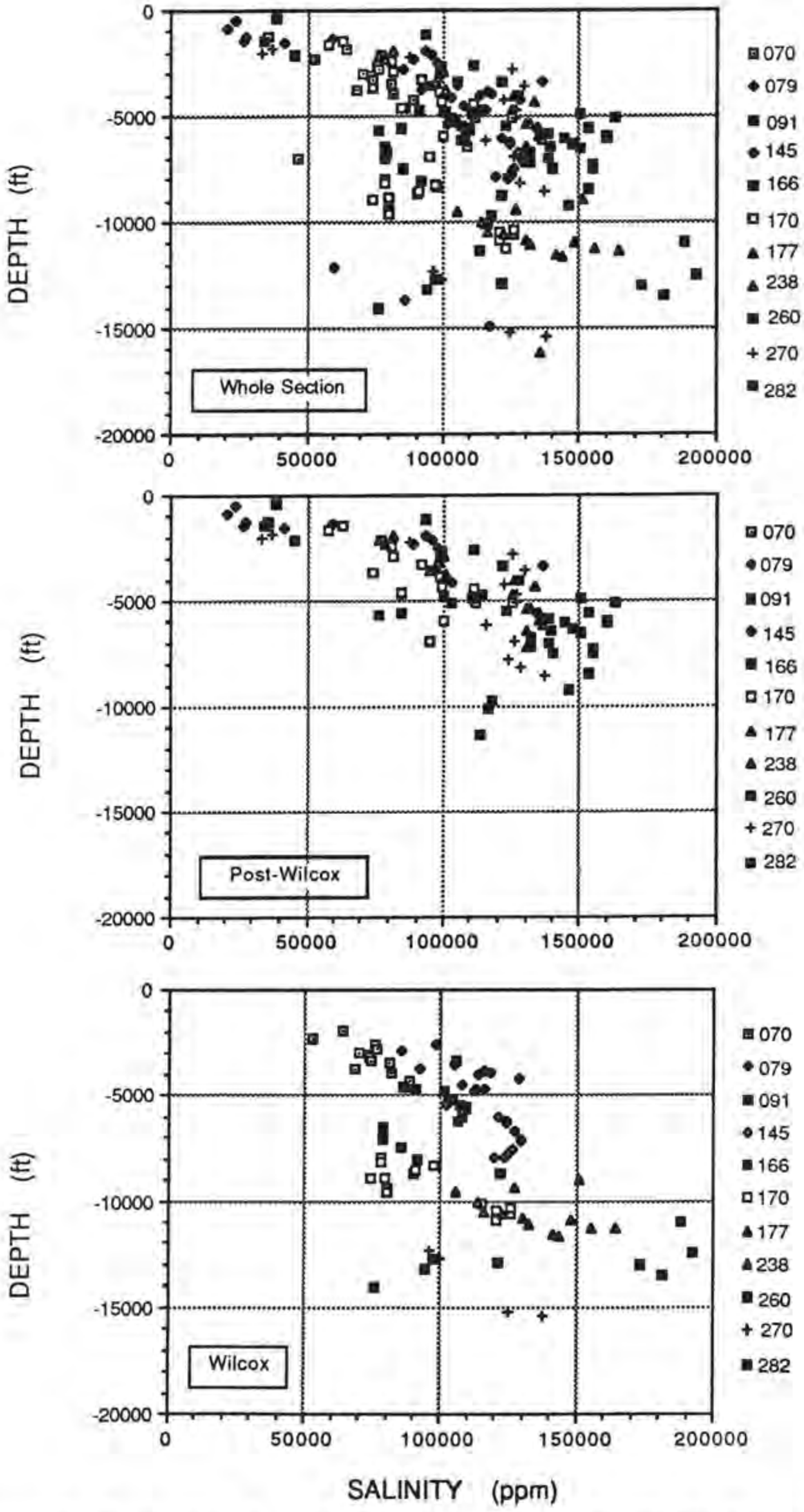

Figure 27. Calculated salinity versus depth plots on wells of the regional cross section A-A' (upper: entire Wilcox and post-Wilcox sections; middle post-Wilcox; lower: Wilcox only).

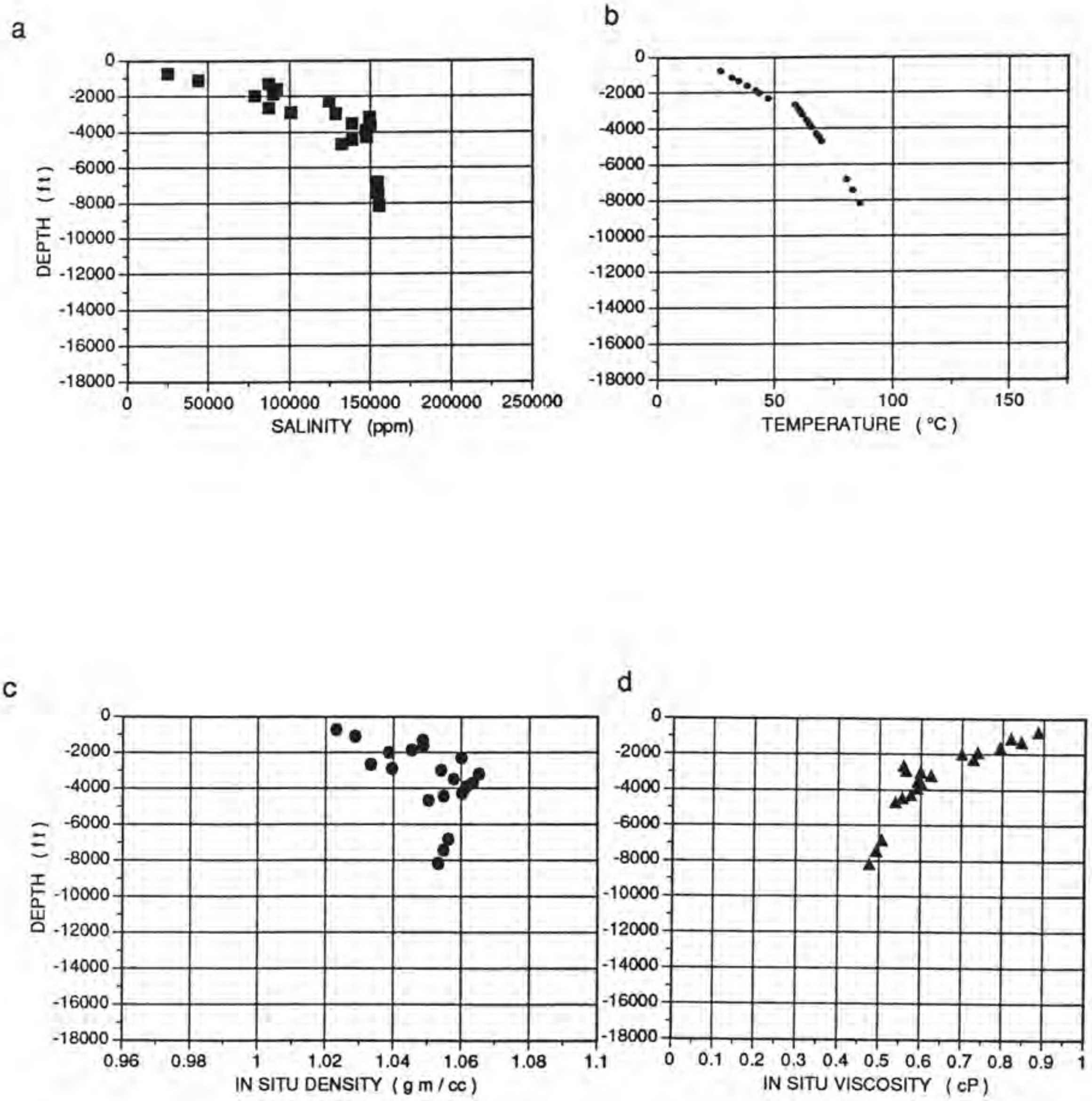

Figure 28. Calculated pore fluid properties on well No. 71 (a: salinity, b: corrected temperature, c: in-situ density, d: viscosity).

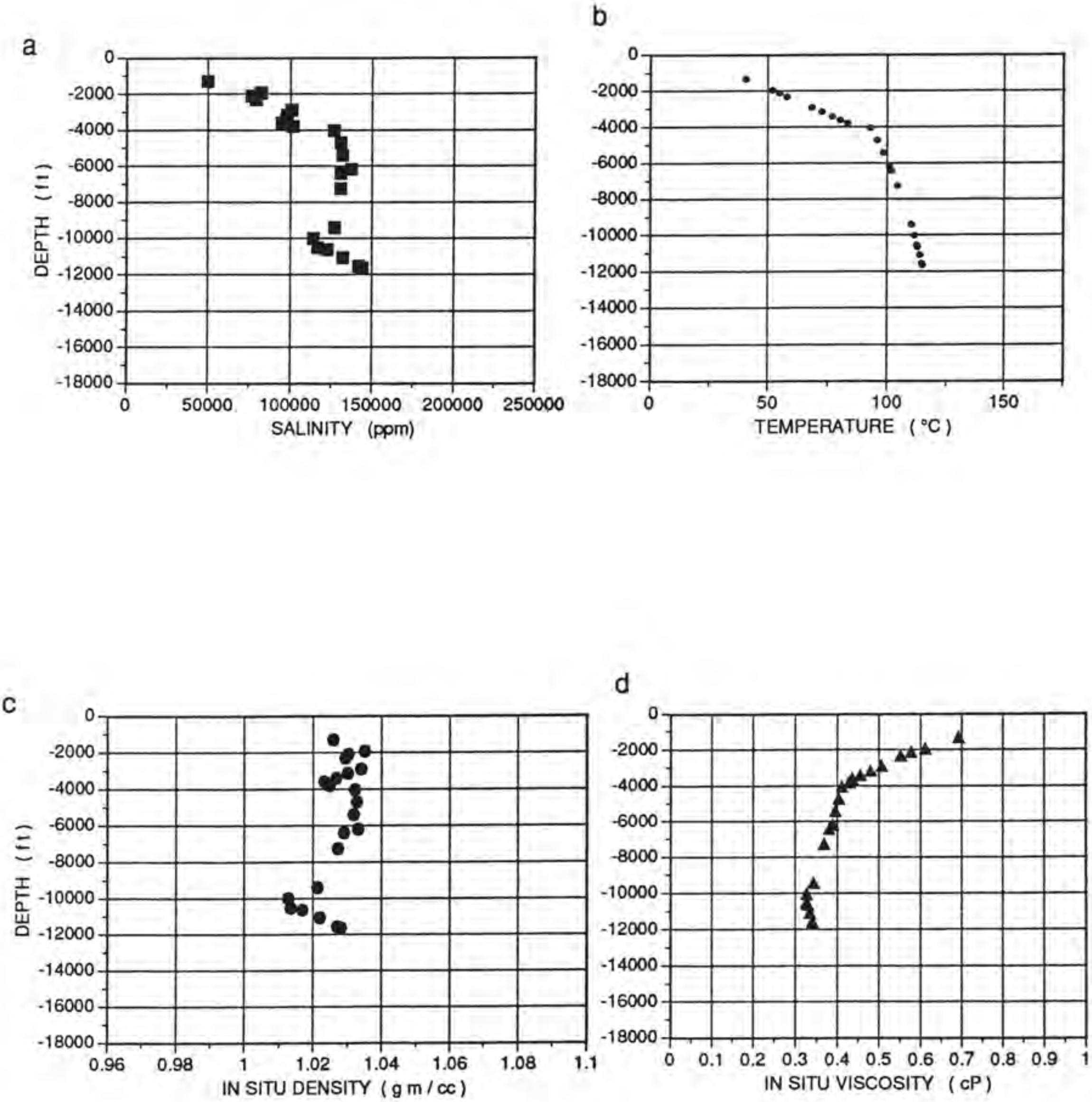

Figure 29. Calculated pore fluid properties on well No. 238 (a: salinity, b: corrected temperature, c: in-situ density, d: viscosity).

RESULTS

Lithology

Four regional cross sections A-D show SP derived sand percentage bar charts (Figure 32-35). Although individual sandstone beds cannot be resolved as a result of averaging over every 100 feet, these sections still represent a general view of regional distribution of sand and shale. Stratigraphic division on the sections is from cross sections published by Louisiana Geological Survey (Bebout and Gutiérrez, 1982, 1983; Eversull, 1984). There are two sand dominant zones; one is the Wilcox Group, the other is post Vicksburg Group which includes the Frio Formation. In the southern half of the study area, a thick shale dominated zone separates the two sand dominant zones.

Within the Wilcox Group, a distinction of upper and lower units can be made. In contrast to the upper part of the Wilcox Group, the lower part of the Wilcox is more sand dominant, as expected from the raw log profiles (Figures 5 and 6). Shape of the sand percentage contours and position of sand rich lobes closely resemble those in the Holly Spring Delta by Galloway (1968) (Figures 7 and 37). Maximum sandstone development occurs in the middle portion of the lower Wilcox.

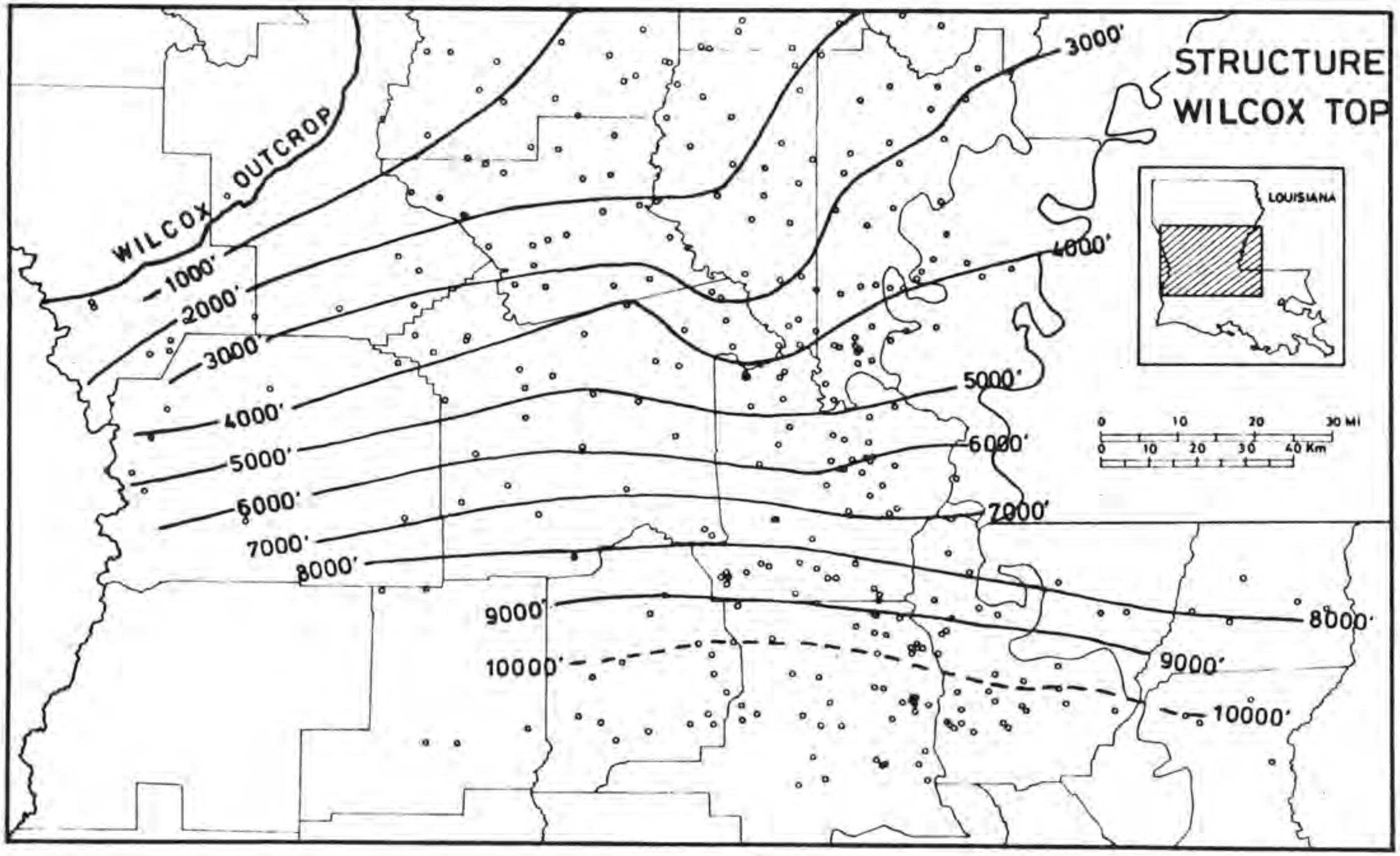

Figure 30. Structure map at the top of the Wilcox Group. Datum is mean sea level (outcrop line from Louisiana Geological Survey, 1984).

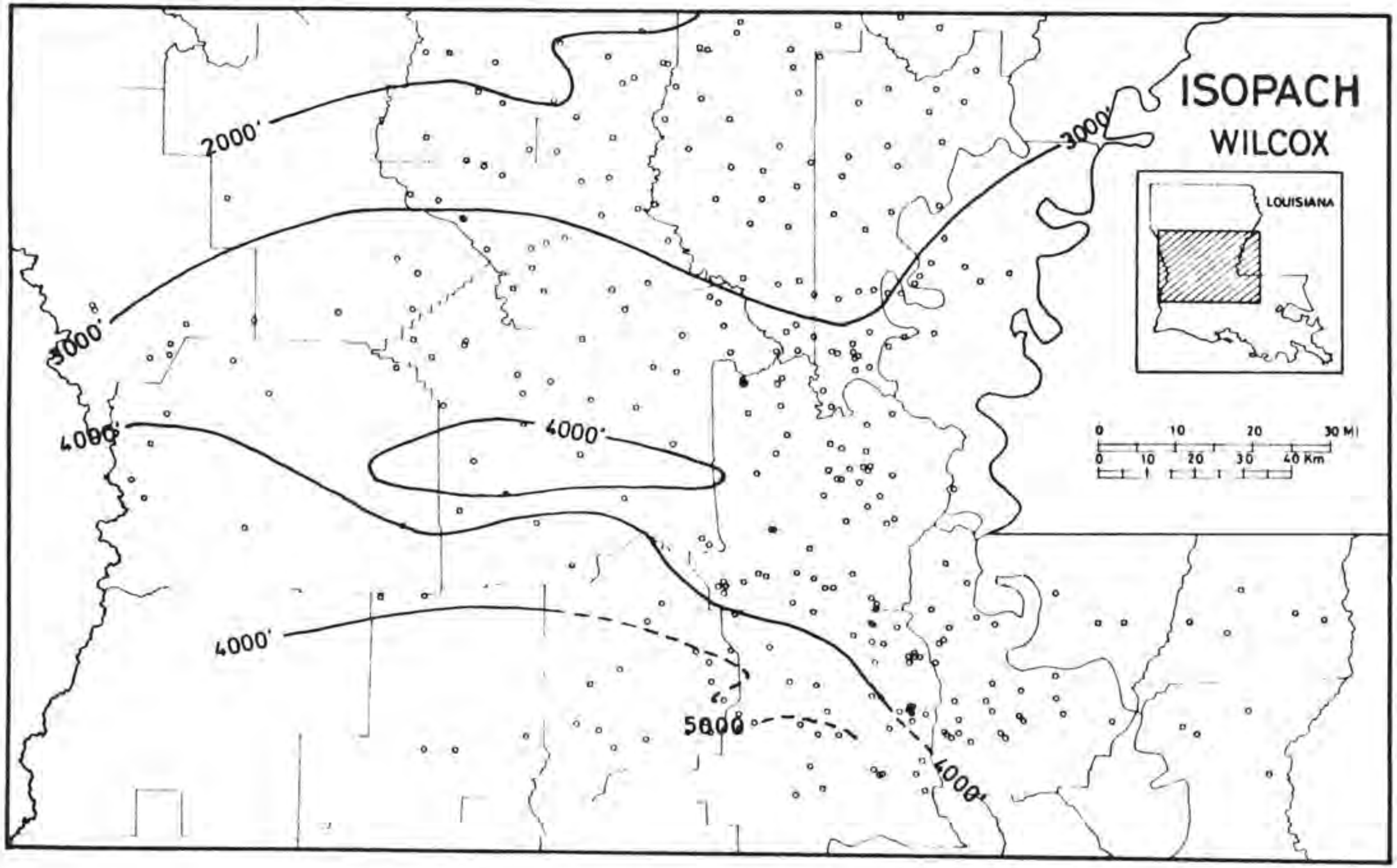

Figure 31. Isopach map of the Wilcox Group.

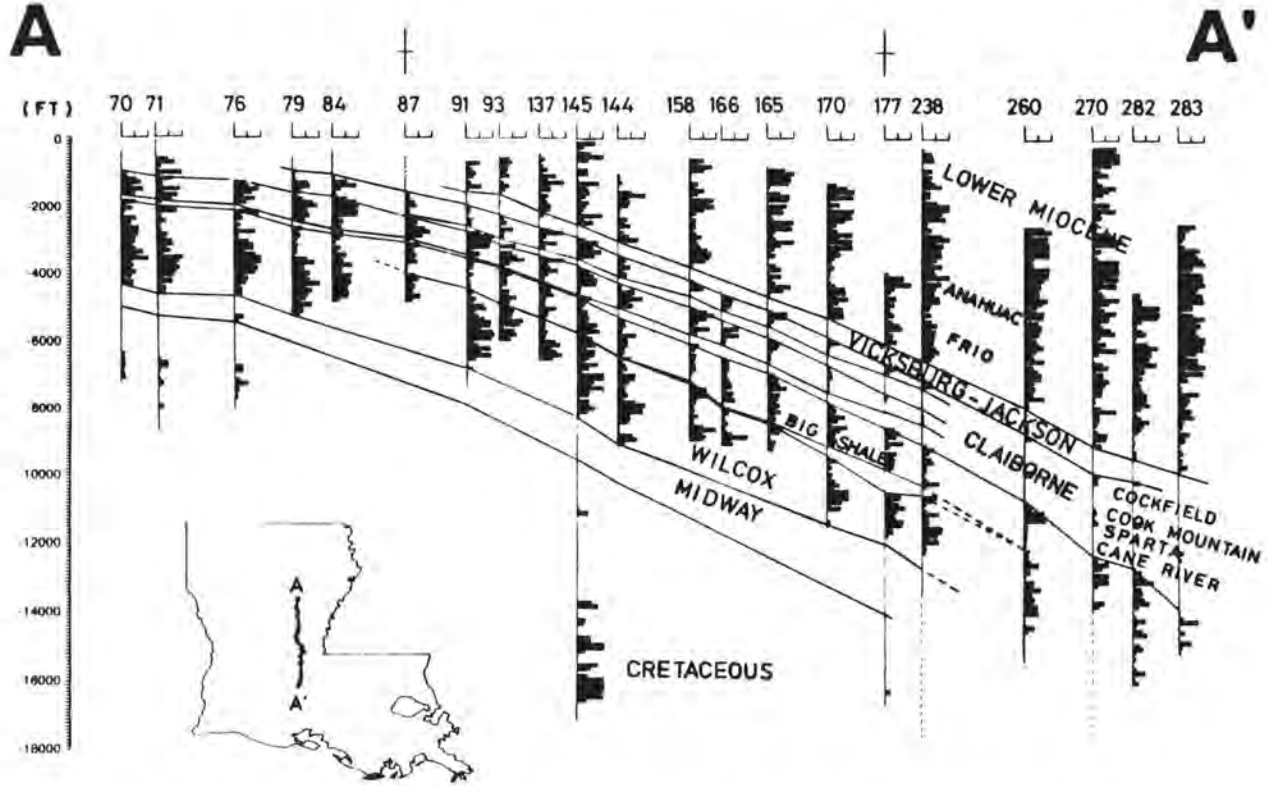

Figure 32. Regional cross section A-A' showing SP derived sand percentages. Approximate stratigraphic divisions on this and other sections are from Eversull, 1984 and Bebout and Gutiérrez,1982). Scale bars for individual wells increase from 0 to 100 percent sand from left to right.

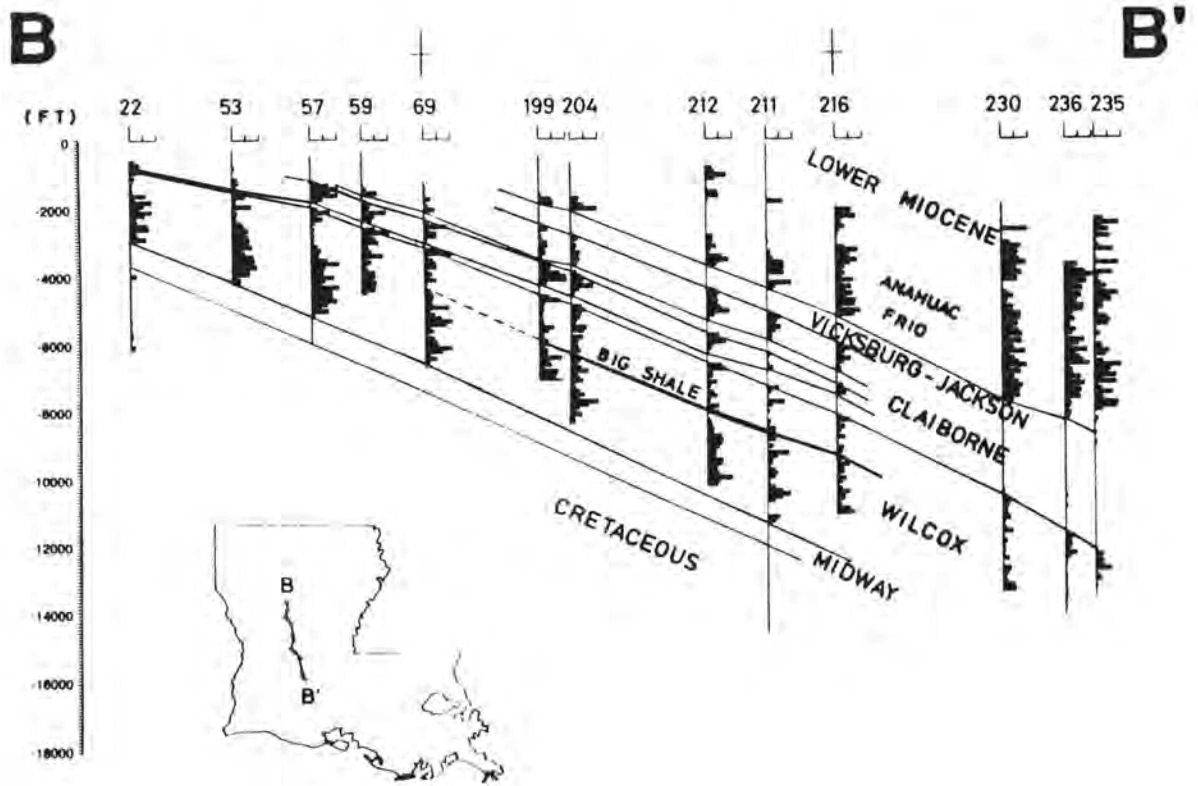

Figure 33. Regional cross section B-B' (see explanation in Figure 32).

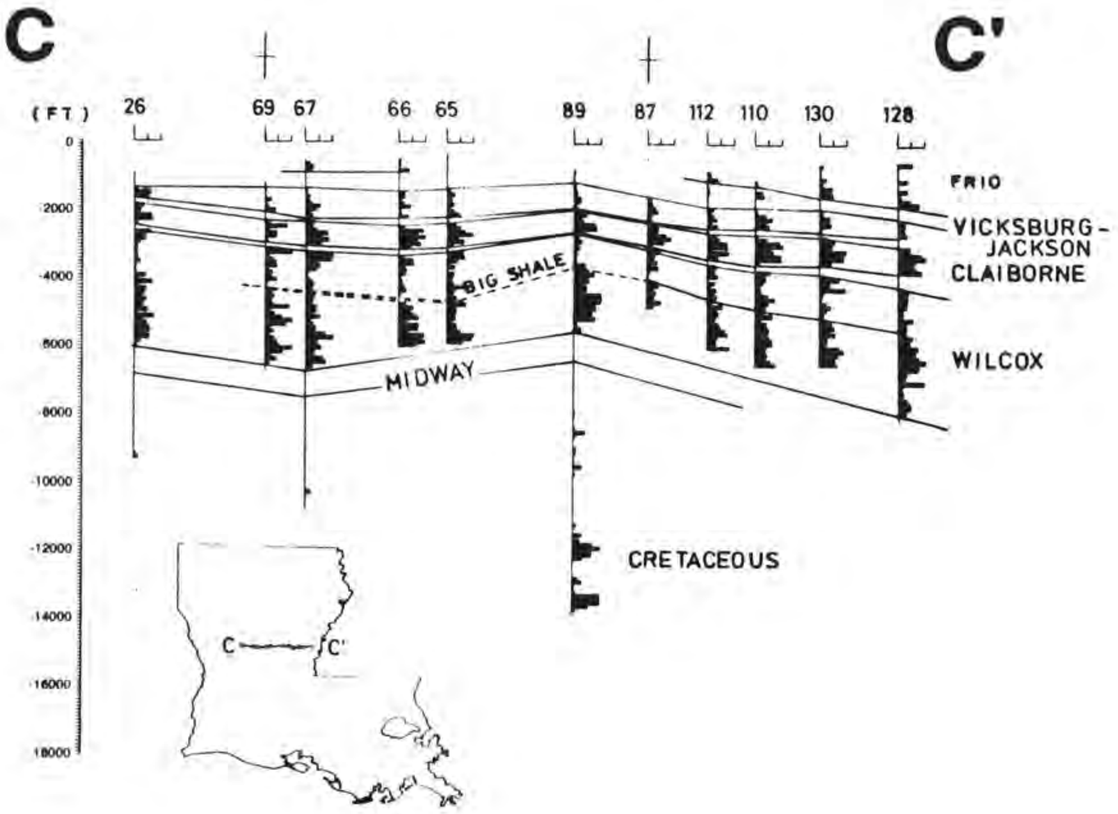

Figure 34. Regional cross section C-C' (see explanation in Figure 32).

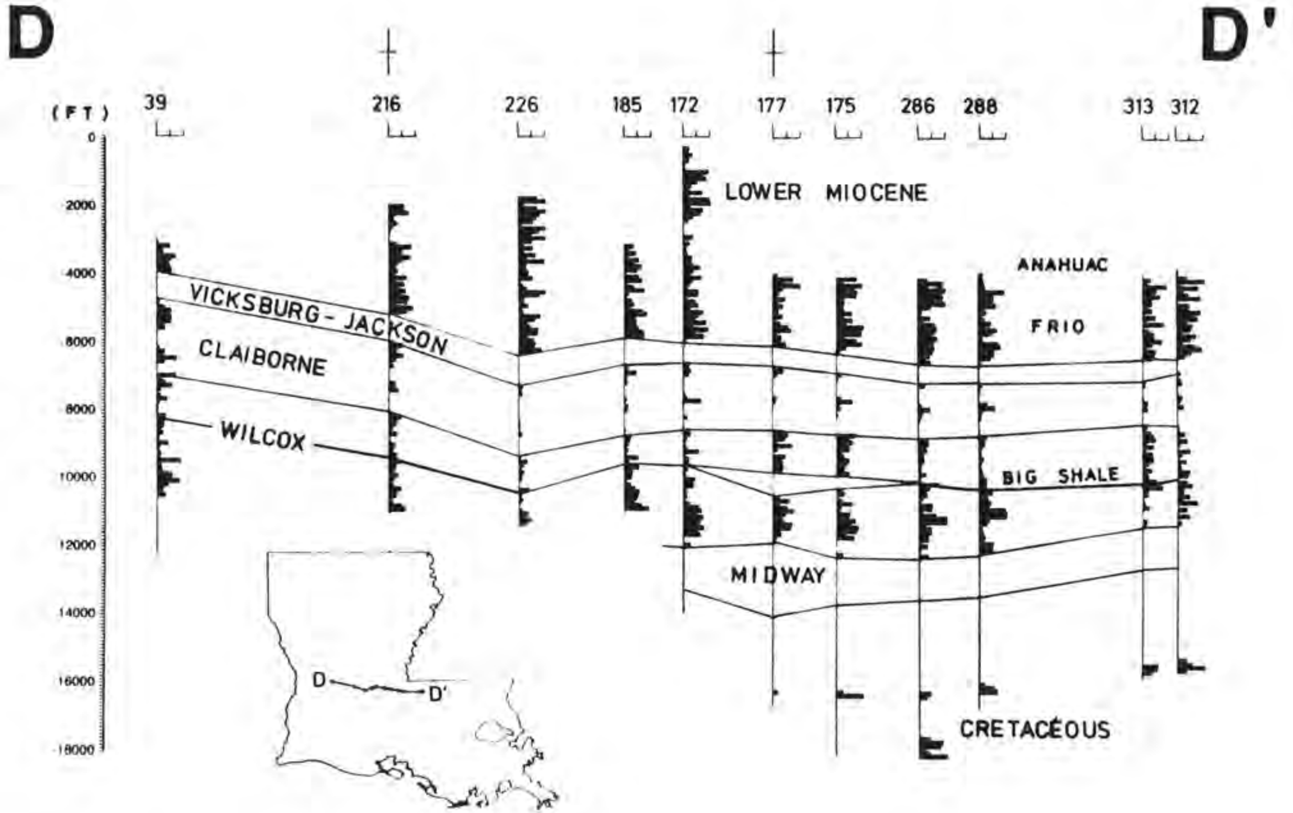

Figure 35. Regional cross section D-D' (see explanation in Figure 32).

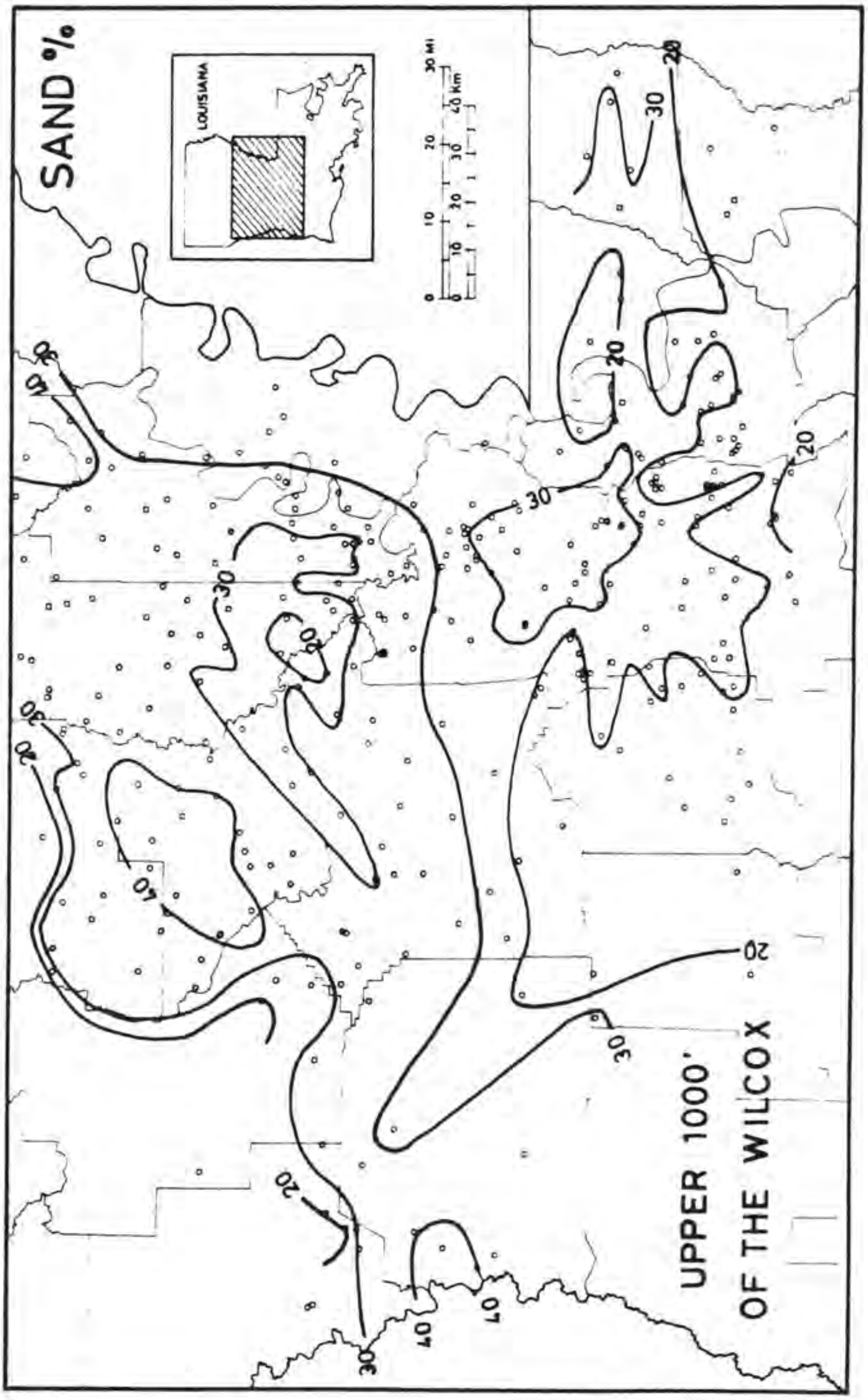

Figure 36. Areal variation in sand percent in the upper 1,000 ft of the Wilcox Group.

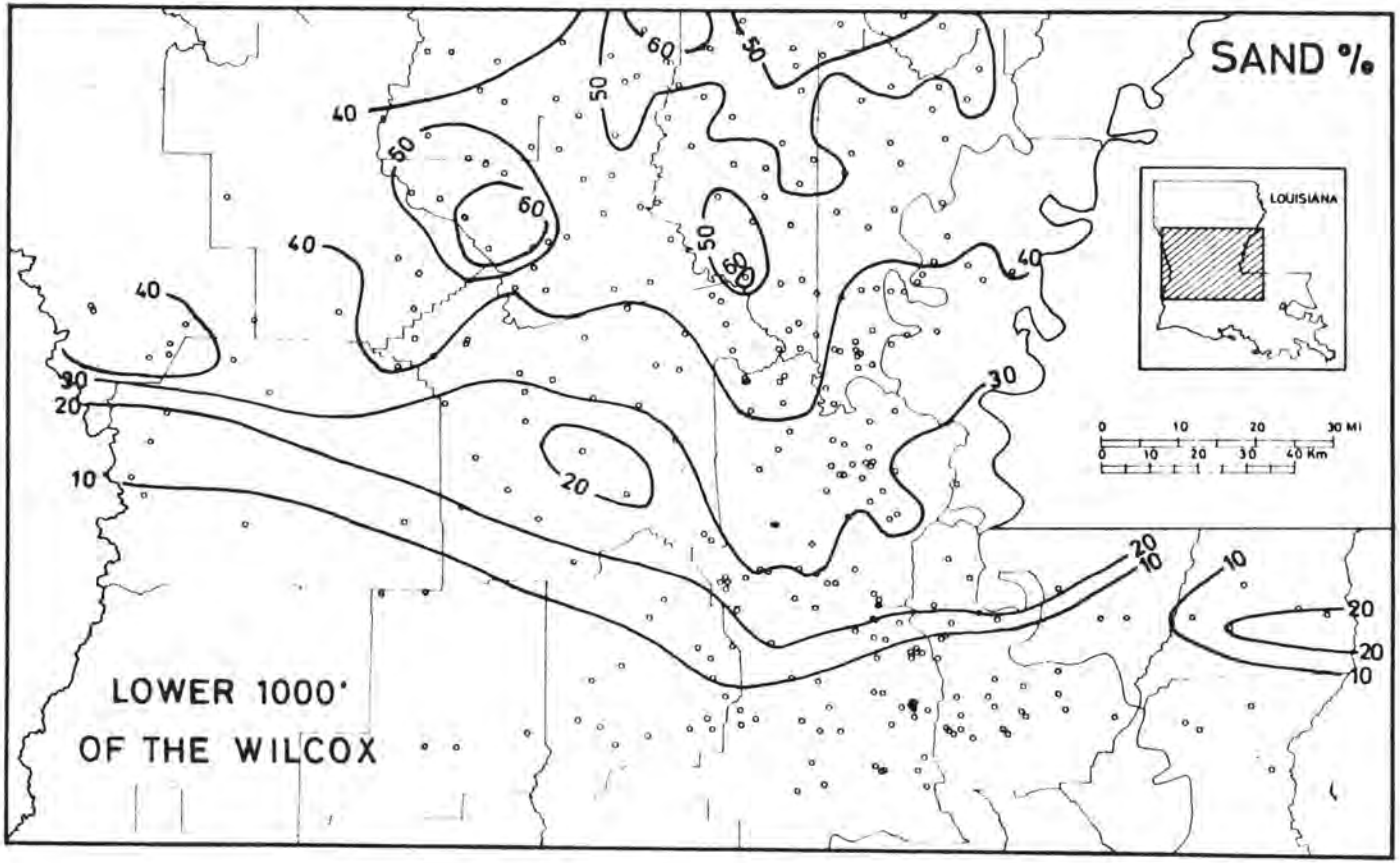

Figure 37. Areal variation in sand percent in the lower 1,000 ft of the Wilcox Group.

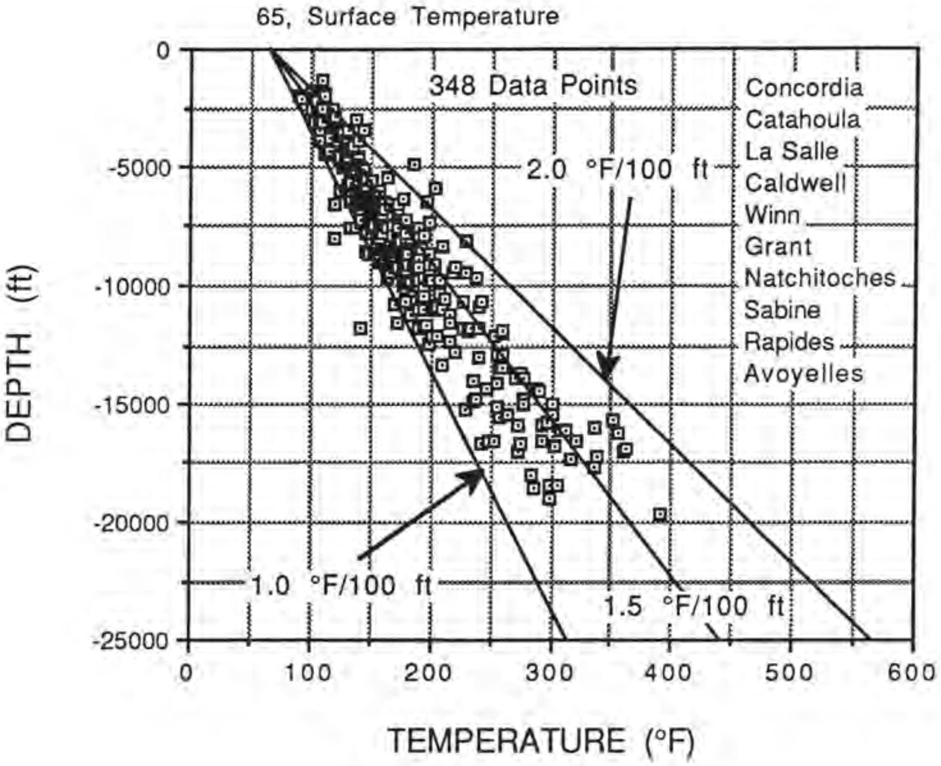

Figure 38. Recorded bottom hole temperature versus depth plot (northern region).

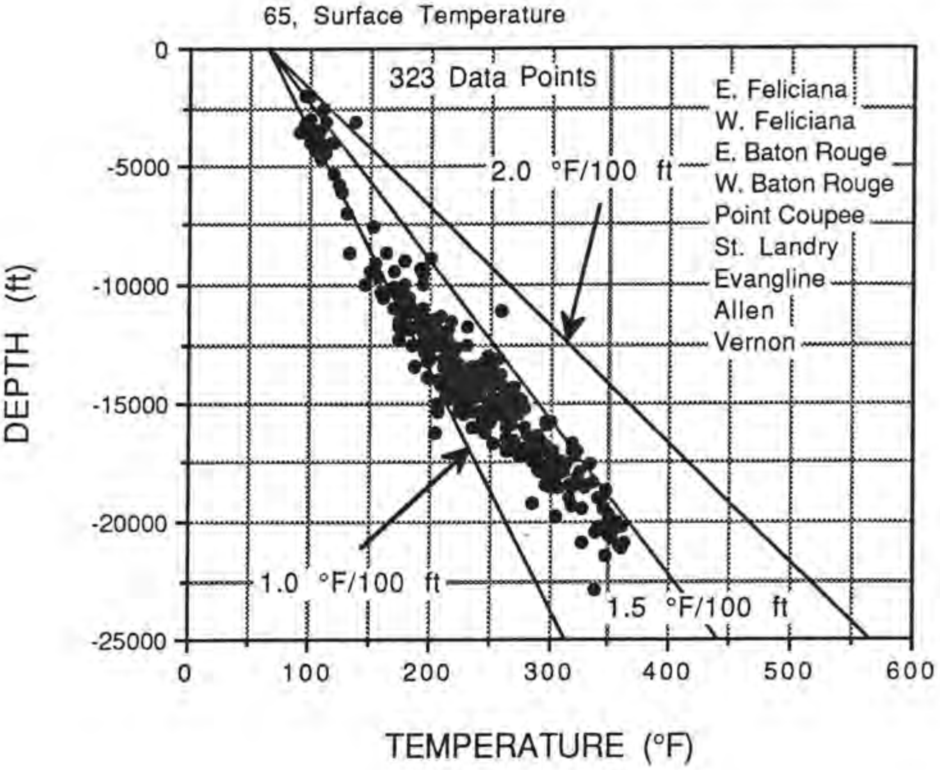

Figure 39. Recorded bottom hole temperature versus depth plot (southern region).

Temperature

Raw temperatures from log headers were plotted against depth (Figures 38 and 39). Temperature increases progressively with depth and the geothermal gradient ranges between 1.0-1.5 °F/ft. In the southern parishes a shift of temperature gradient is observed at 13,000 to 15,000 ft, possively reflecting a change in the thermal conductivity in the overpressured, shale-dominated section.

Pore Fluid Pressure

Because both mud resistivity data and mud weight data are sparse, only an approximate estimation of pore fluid pressure is possible. Due to the same reason, the lower boundary of the hydropressured zone (0.465 geostatic ratio) can not be clearly delineated. Pore fluid pressure profiles calculated from mud weight (Figure 40) show that the geopressured interval occurs below about 13,000 ft, although determination of the exact depth for each well is not possible. Pore fluid pressure derived from mud resistivity (George graph) provides similar profiles in southern most part of the study area (e.g., Figure 41, southernmost well on section A-A'). However, the George graph does not provide reliable pore pressure values in most of the area, which is presumably hydropressured. The reasons include a lack of thick shales and a lack of clean shale intervals required to make the calculations. Many shale resistivity-depth data sets plot out of range on the George graph. This makes sense because the George graph was originally made derived for south Louisiana shales.

Approximate pore pressures, expressed as geostatic ratio contours, were drawn on a cross section A-A' (Figure 42). Only the deep section in southernmost part of the study area is geopressured (geostatic ratio of 0.7 and above).

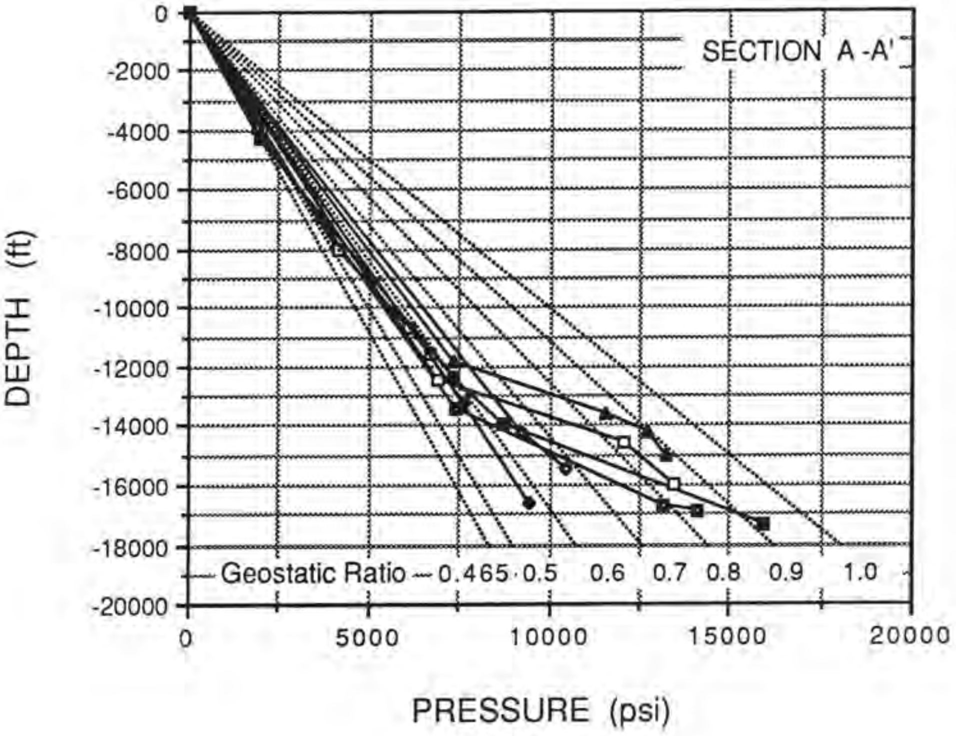

Figure 40. Pore fluid pressure profiles derived from mud weight on the wells of regional section A-A'.

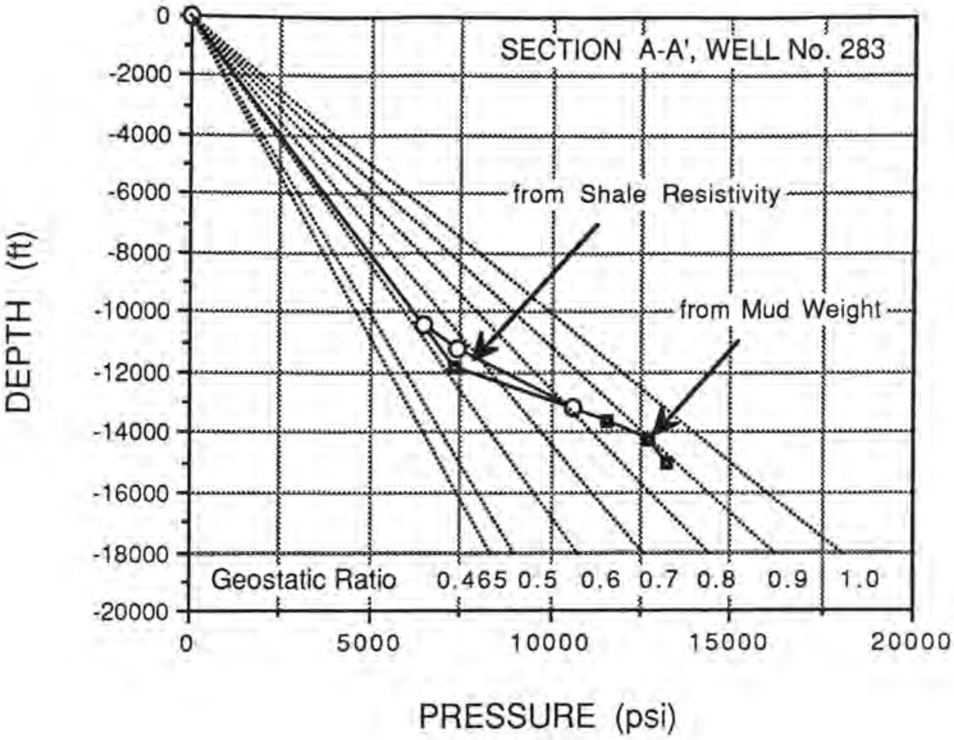

Figure 41. Comparison of pore fluid pressure derived from mud weight and shale resistivity using George graph (well No. 283).

Salinity

Stratigraphic Variations in Salinity

There is a relatively thin freshwater zone (Smoot, 1988) over most of the study area which is not considered in this study. Although waters in sediments at time of deposition originally contained fresh to marine waters (0-35,000ppm), at the top of the sections there is a little saltier (but less than 50,000 ppm) water mass with deeper base across central to northern portion and shallower base across southern portion of the study area.

Salinity increases linearly and continuously with depth across the entire Cenozoic stratigraphic section in the northern part of the study area. With the thickening of the Claiborne trough Vicksburg shale units, immediately above the Wilcox to the south, however, there is a reversal in salinity with depth and the development of two distinctly different salinity regimes (Figures 42-45).

Very little information on salinity within the Claiborne through Vicksburg shale zone is available because of lack of sandstones. However, salinity calculated for several sandstones within the shale dominant zone shows transitional values between the overlying and underlying sand dominant zones. It is not possible to conclude whether this suggests transitional values reflect true salinities or underestimated values due to the shaly nature of the units. If the transitional phenomenon is true, it would be likely the result of lateral continuity of the reservoir, such as Sparta formation, instead of vertical reservoir connection.

The SP derived salinities were compared to actual measured salinities reported in the literature. Salinity profiles versus depth of the Wilcox were plotted (Figure 8a, b) using analyses of Hawkins et al. (1963). These plots also show a simple salinity increase trend with depth. A plot of SP derived salinities (Figure 27) matches not only the analytical trend but also the magnitude of salinity range. Unfortunately water analyses for depths below 6,000 feet are not available for comparison.

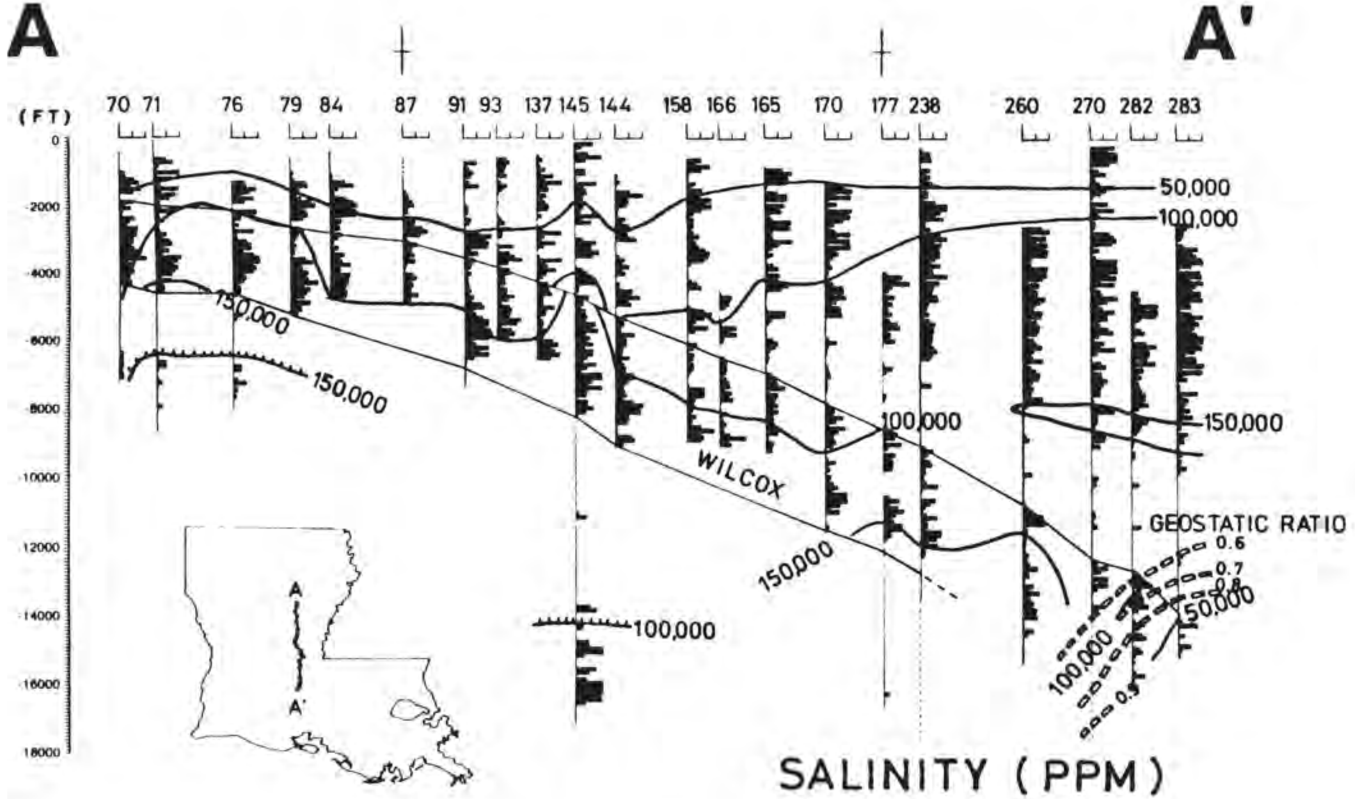

Figure 42. Salinity profile on regional cross section A-A' (see stratigraphy in Figure 32). Hachure marks on low salinity side of selected contours.

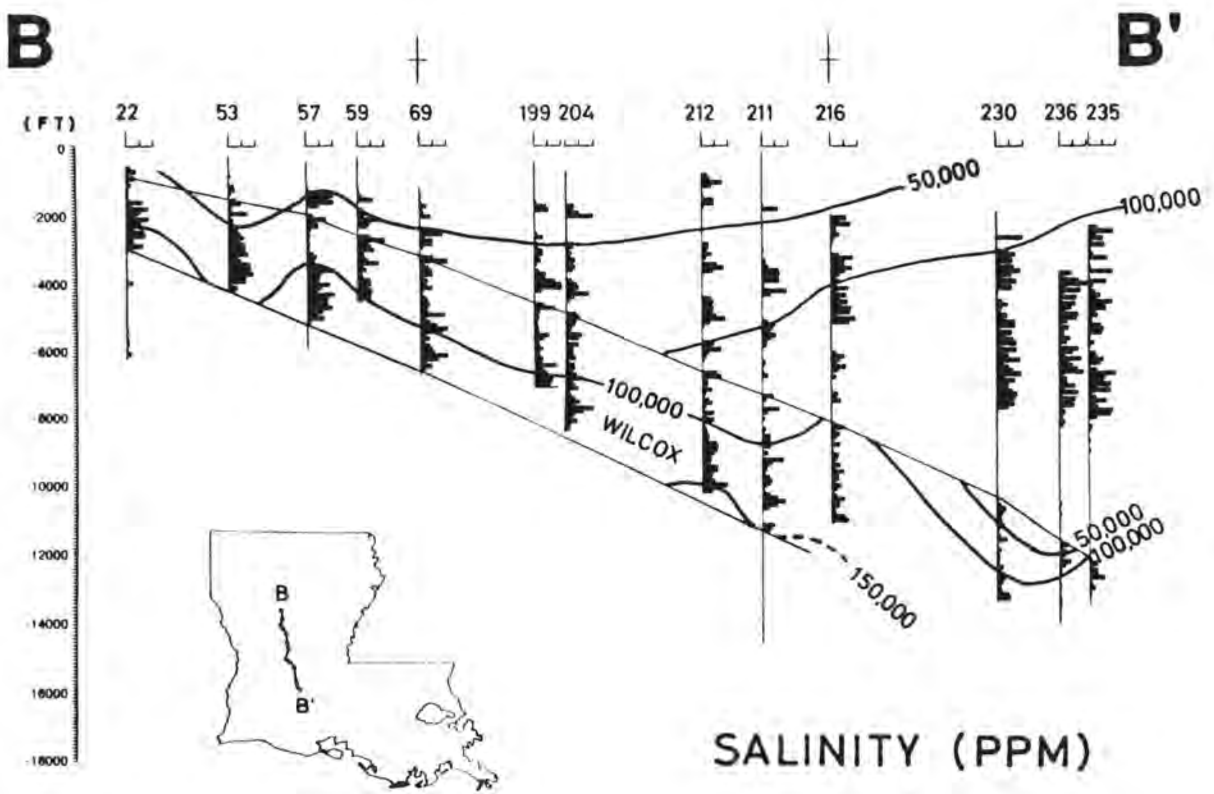

Figure 43. Salinity profile on regional cross section B-B' (see stratigraphy in Figure 33).

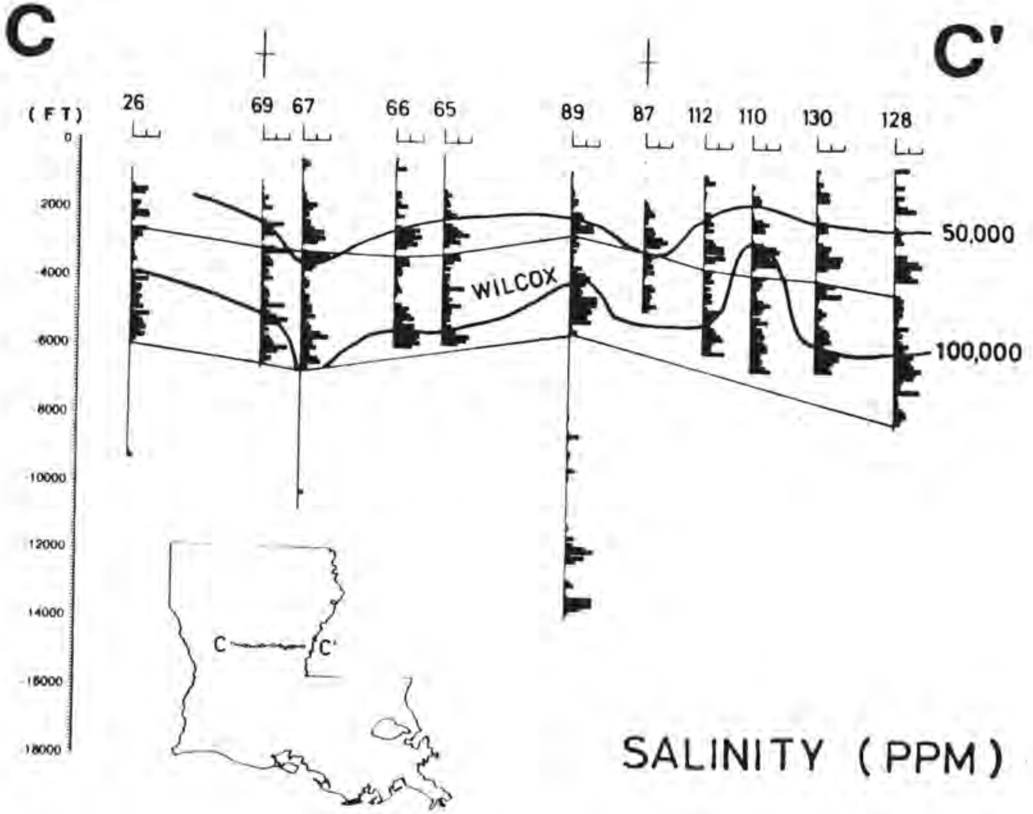

Figure 44. Salinity profile on regional cross section C-C' (see stratigraphy in Figure 34).

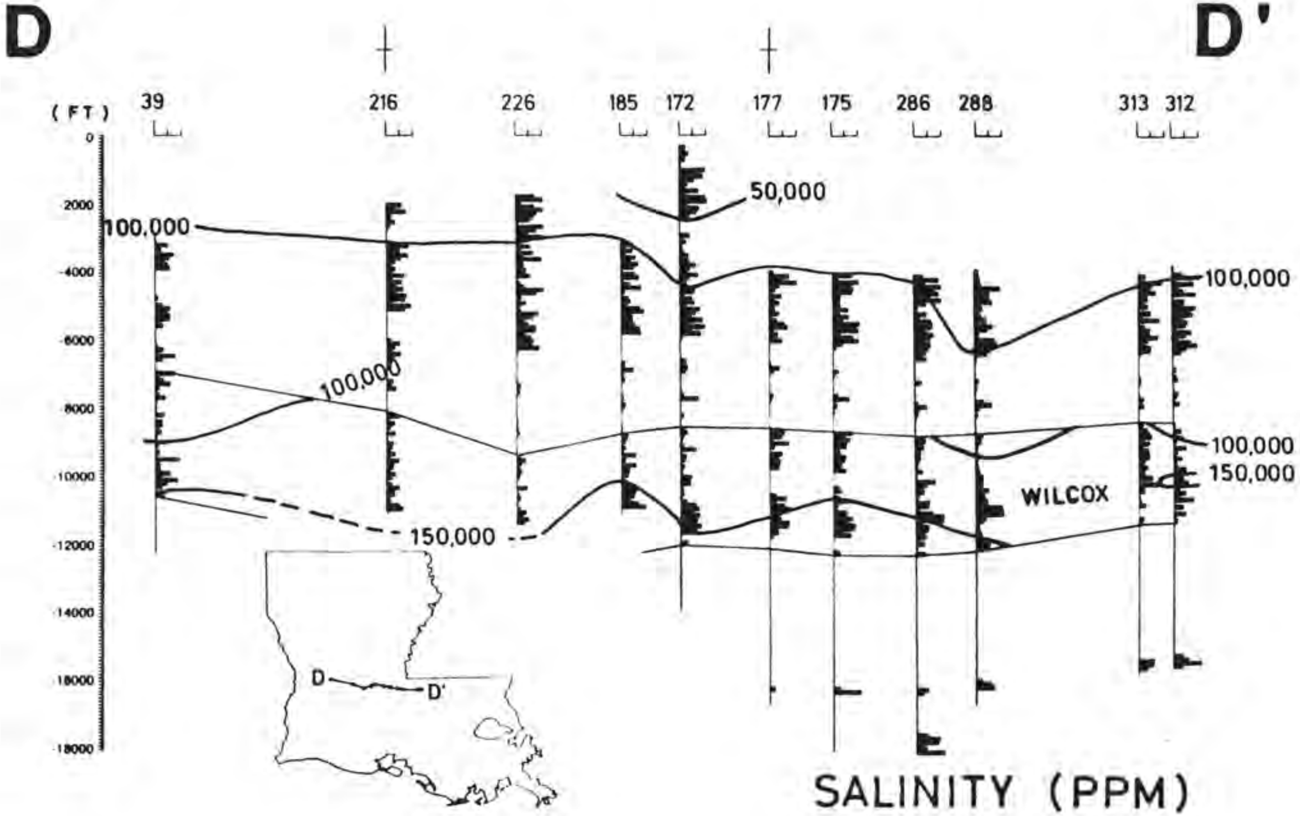

Figure 45. Salinity profile on regional cross section D-D' (see stratigraphy in Figure 35).

Areal variations in Salinity

Figures 46 and 47 show the areal variation of salinity within the Wilcox Group representated by two horizons; top of the upper and lower 1,000 ft of the Wilcox Group. At the very top of the Wilcox salinity varies from less than 35,000 ppm to more than 100,000 ppm. At the top of the lower 1,000 ft of the Wilcox it varies from about 75,000 ppm to 150,000 ppm.

A salinity distribution map for the top of the Wilcox Group by Collins (1975, Figure 10.16) is directly correlatable with Figure 46 of this study although Collins shows no control and did not document how his salinities were derived. In this case absolute values and spatial variation pattern show an excellent match. Pettijohn et al. (1988) also show the spatial variations in salinity at the top of the Wilcox. Their map has very limited areal coverage and shows lower salinity range compared to the results of this study and that of Collins (1975). Other horizons within the Wilcox Group studied by Collins (1975) and Pettijohn et al. (1988) cannot be directly compared with this study because of the difference of reference horizons.

The spatial variation in salinity may reflect in part lithology. Both salinity distribution maps of the upper and lower 1000 ft (Figures 46 and 47) and corresponding sand percentage maps (Figures 36 and 37) show similar overall appearance. The relatively simple appearance of the lower 1000 ft of the Wilcox

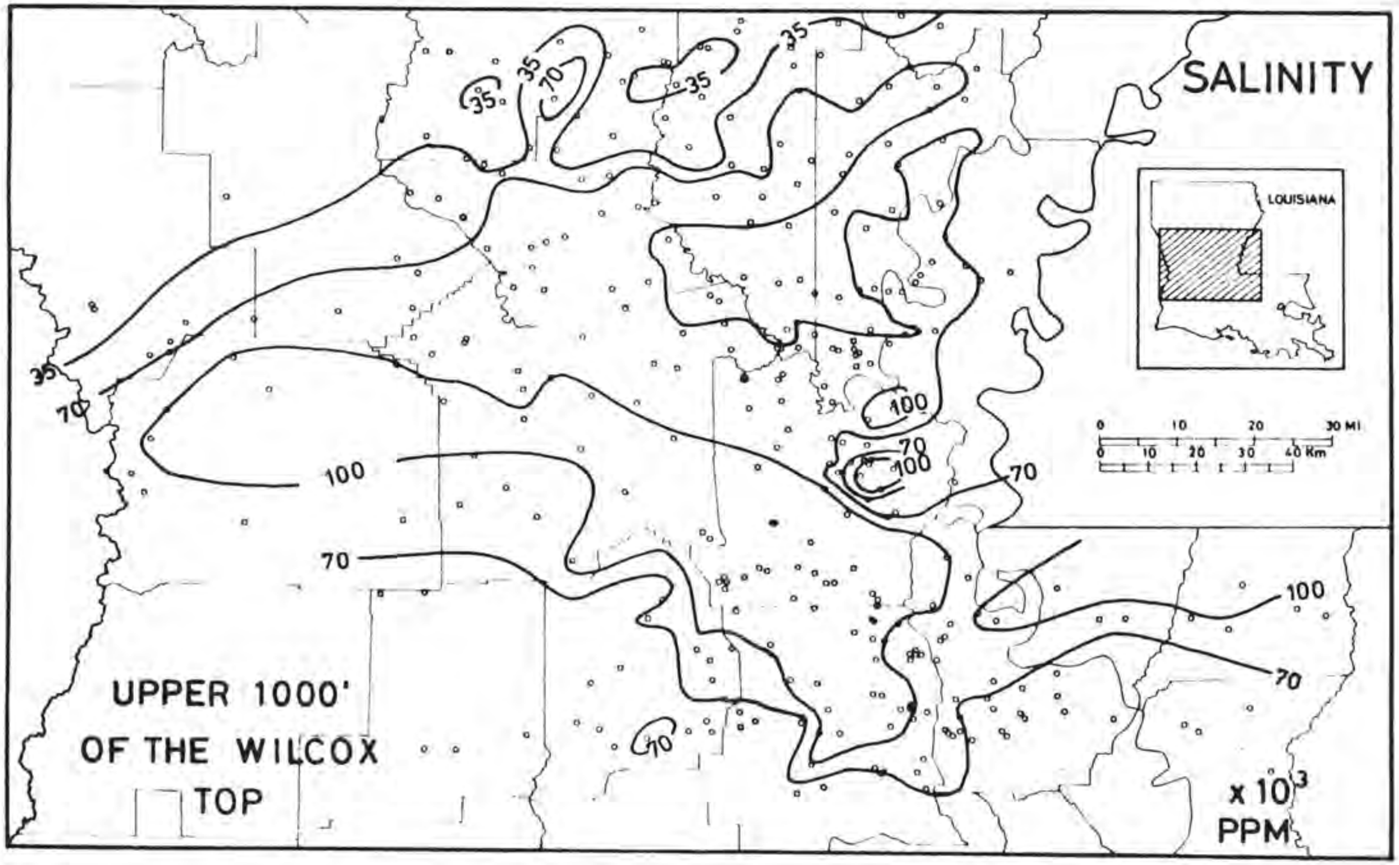

Figure 46. Areal variation of calculated salinity at the top of upper Wilcox Group.

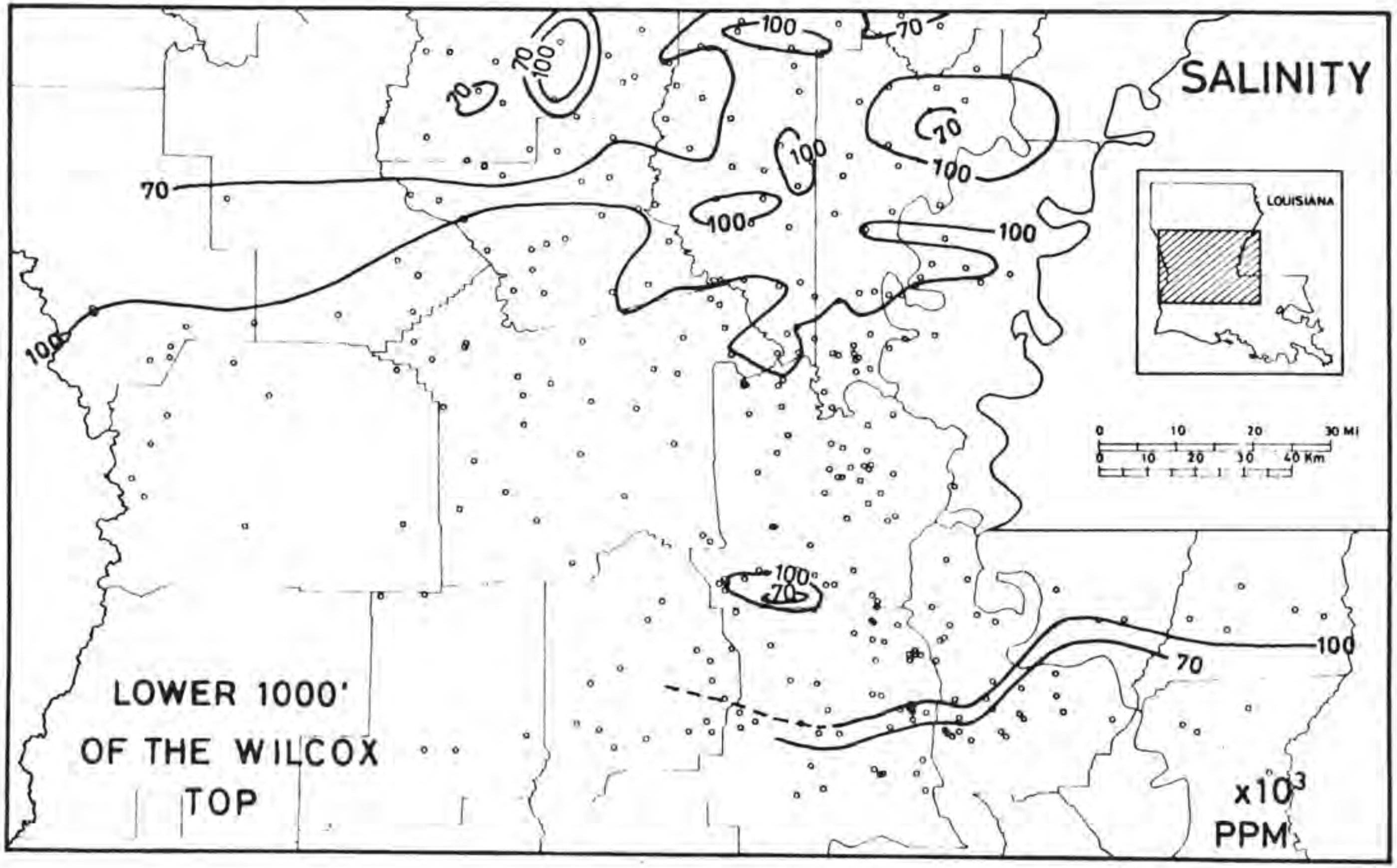

Figure 47. Areal variation of calculated salinity at the top of lower 1,000 ft of the Wilcox Group.

salinity distribution map suggests greater lateral reservoir transmissibility in sand dominated lower Wilcox than in the less sand dominant and more irregular variations in total sands in the upper Wilcox.

Anomalously high salinity values were obtained in several places in the uppermost part of the Wilcox Group. These points do not follow the trend of progressive salinity increase with depth. Because these points are not many, one or two points in each well, if present at all, these were not included on the salinity distribution map of upper 1000 ft of the Wilcox. One possibility for these higher salinity values is a difference in sandstone composition, reservoir quality, or unconformity related to a locally restricted low lateral transmissibility.

The overall salinity profile within the Wilcox Group can be characterized by a progressive salinity increase downdip and with depth, with a reversal to lower salinities in the geopressured zone (Figure 42). The Big Shale and the anomalous shale of McCulloh and Eversull (1986), are apparently not impermeable barriers in terms of salinity distribution.

Variations near Salt Domes

Local effect of vicinity of salt domes on salinity distribution in the Wilcox Group is not clear. There are somewhat higher salinity values compared to the surrounding areas in several areas in the northern part of the study area near salt domes in Winn and Catahoula parishes. However, the opposite pattern, i.e. lowered salinities, was also seen at the southwestern corner of Avoyelles Parish in the southern salt dome province. Most of higher salinity anomalies may reflect the presence of nearby salt domes or may be possible errors attributed to uncertainties in the calculations. Another explanation seems possible why pore waters near the northern salt dome provinces are not so saline as expected. For instance, in Winn Parish there are several shallow salt domes such as Winnfield, Coochie Brake, and Cedar Creek (Halbouty, 1979). The area is, on the other hand, sand dominant Wilcox and the post Wilcox reservoirs also located at relatively shallow. Those reservoirs connect well with each other; as a matter of fact the salinity increase trend is continuous through those two units. The lowered salinity may be the result of mixing with shallow meteoric waters in this very sandy vertical sequence, which masks the effects of salt dome dissolution.

Density and Viscosity

Figures 28 and 29 show two examples of in-situ density of pore fluids on the regional cross section A-A'. In contrast to the results of south Louisiana, where there is pronounced density maximum at intermediate depths (Hanor et al., 1986), there is much less systematic variation in density with depth. Some wells show the density increase with depth but some do not within the post-Wilcox sections. On the other hand, most wells show the density increases with depth within the Wilcox Group except in the geopressured zone although some are ambiguous. In many wells the range of density variations within the post-Wilcox sections is less than that in the Wilcox.

Problems in the density results are 1) the Phillips algorithm and 2) uncertainty in the temperature data. As discussed in the preceeding section, Phillips algorithm yields higher density value at low temperature low region, that corresponds to currently discussed portion. Again the corrected temperature used in the density calculation were not corrected in terms of drilling mud circulation time and duration between the circulation stopped and recorded the temperature.

Pore fluid viscosity profile is more like to that in south Louisiana (Hanor et al., 1986). That is, the viscosity progressively decreases with depth whereas salinity increases with depth (Figures 28 and 29). This situation allows pore fluids in deep reservoirs to move readily.

Possible Fluid Migration Patterns

Possible Origin of Dissolved Salt and Pore Water Migration

The connate waters incorporated into pore spaces at the time of sediment deposition have salinities reflecting the depositional environment. The connate waters of the Wilcox reservoirs presumably had salinities close to that of sea water or less initially. Salinities of connate waters of the post-Wilcox also were thought to be same as in the Wilcox. However, prominent progressive salinity increase trends have been recognized (Figures 27-29; 42-45).

Highly saline pore waters observed in Cenozoic sediments in south Louisiana has been attributed to salt dissolution from salt domes (Bennett and Hanor, 1987; Hanor et al., 1986; Hanor and Sassen,1990; Hanor and Workman,1986; Workman and Hanor,1985). Hanor and Sassen (1990) postulated that salt dissolved from salt domes generated saline pore waters in the Wilcox and that dissolution at shallower depth produced density inversions of pore fluid to lead large scale vertical and lateral fluid migration. Because both the Wilcox and the post-Wilcox units show stratified salinity profiles and linearly increase salinity with depth, it seems there are two-fold pore fluid evolution separated by the shale dominant zone. In the section A-A', 100,000 ppm iso-salinity line shows progressively shallowing toward south Louisiana. If the inferred Opelousas salt dome, (Dixon, 1965) is true salt dome, it would generate saline pore fluid as well as the nearby Port Barre salt dome. Hence the mechanism of salt dissolution may be applicable to this area.

Hydrocarbon Migration

Considering the organic geochemical constraints, oil and gas have presumably migrated laterally from the south through the Wilcox Group Sassen et al, 1988). The present distribution of oil and gas fields (Figures 10 and 51) reflects a buoyancy-driven trapping pattern with a pronounced lateral component because there are no major faults which would permit vertical fluid transportation. Areal variations in API oil gravity distribution (Figures 48 and 49) show progressively viscous oils updip toward the north, which is particularly evident in the uppermost Wilcox reservoirs (Figure 50). This situation could have provided optimal oil entrapment as a result of progressive decrease of viscosity. A similar pattern of progressive API gravity increase with depth in Smackover oils in North Louisiana have been explained by thermal alteration (Sweeney, 1990). However, considering the probable position of Wilcox generation downdip, far to the south, biodegradation associated with freshwater washing is more likely than thermal alteration. The shallower Wilcox has had more opportunity for contact with pore waters with bacteria because these shallow waters are more open to the atmosphere. Bacteria can metabolize preferentially certain types of hydrocarbons. Water washing may preferentially remove water-soluble lighter compounds. Both the biodegradation and water washing alter oil composition and produce heavier, more viscous oils (Tissot and Welte, 1984).

It should be noted that there are three discrete Wilcox oil production trends in the area shown in Figure 48. Among these unnamed trends, the direction of a trend running from Avoyelles through Winn parishes in the west coincides with the axis of the La Salle arch, which has provided an optimal structural high for hydrocarbon accumulation. The La Salle arch is the most distinct structural element in the relatively featureless study area. However, the La Salle arch did not significantly influence localization of depositional facies even though it was in existence in Wilcox time (Galloway, 1968).

Structural dip decreasing to the north as shown in Figure 30 also has an important role in hydrocarbon entrapment because this situation progressively reduces the buoyancy forces acting on hydrocarbons. This may particularly be effective along the axis of the La Salle arch as suggested from the spacing of contour lines (Figure 30).

Another aspect evident in Figure 51 is control of hydrocarbon migration by shale dominant zones. As a first order approximation, the post Wilcox shale zone provided a vertically sealing barrier which prevented vertical escape of hydrocarbons and led them to the final destination within the Wilcox reservoirs in northern central Louisiana. Another probable barrier was the Big Shale. Although log control appears to be insufficient, the northern limit of the thick Big Shale distribution seems coincide with entrapment of hydrocarbons at the uppermost portion of the Wilcox Group instead of the lower Wilcox. Because oil production from the post-Wilcox just above the area with Wilcox oil production from the uppermost of the Wilcox seems minor (Appendix 4), the shaly zone of the Claiborne Group in the northern part of the study area retains an effective sealing ability for oil entrapment. Overall appearance of stratigraphic position of hydrocarbon pools suggests the migration pathway from downdip to updip, which is consistent with the pathway suggested by organic geochemical constraints.

Individual sand packages might have also been responsible for local entrapment of hydrocarbons (Shreveport Geological Society, 1961; Galloway, 1968). As pointed out by Galloway (1968), there are areal trends of selected producing sands of the Wilcox reservoirs (Figure 52).

Finally it will be worth mentioning that an area with densely distributed oil fields shown in Figure 52 is located just north of a sandstone lobe of the Holly Spring Delta developed in the lower Wilcox Group. This sandstone lobe, extended to the south (Figure 37), could have been acted as a conduit for hydrocarbon migration from the southern Louisiana.

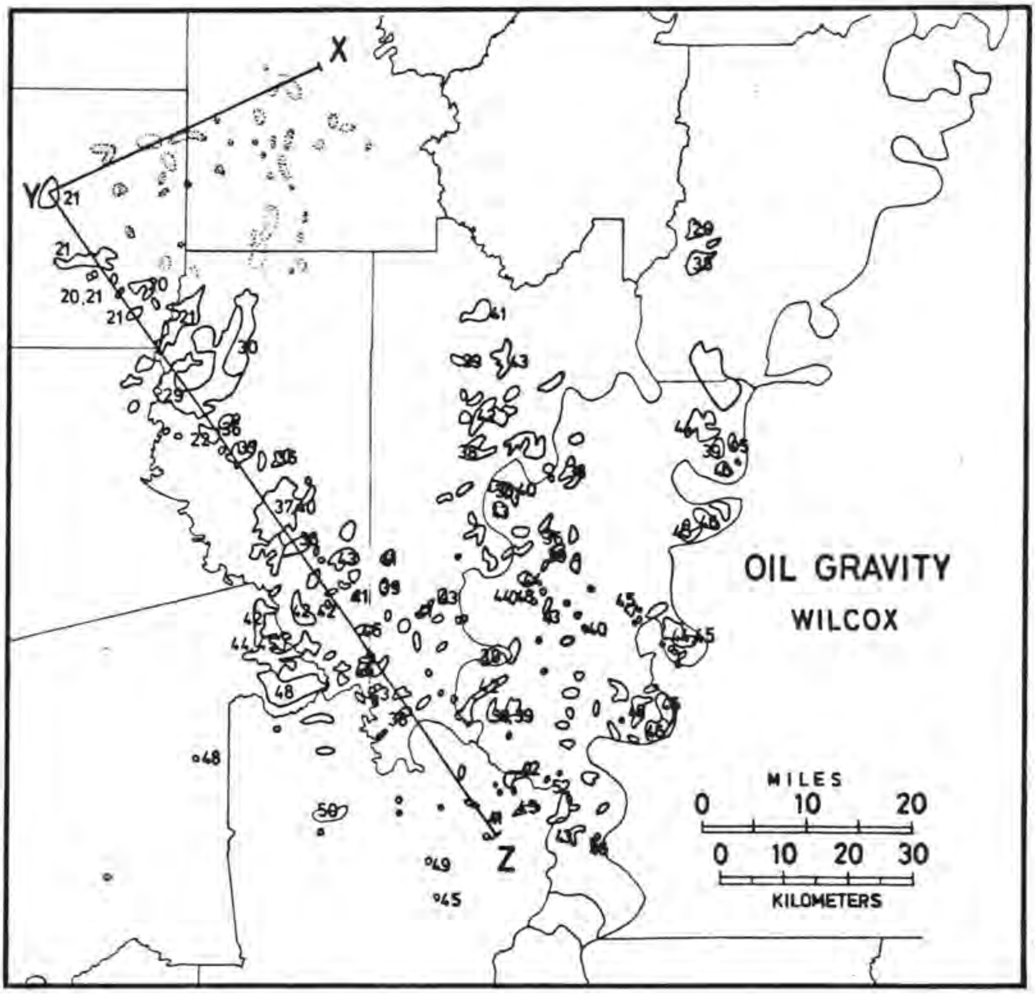

Figure 48. Areal variation of Wilcox API oil gravity (data from Mason Map Service and International Oil Scouts Association, 1990; Office of Conservation, 1979; map from Stanfield et al., 1981).

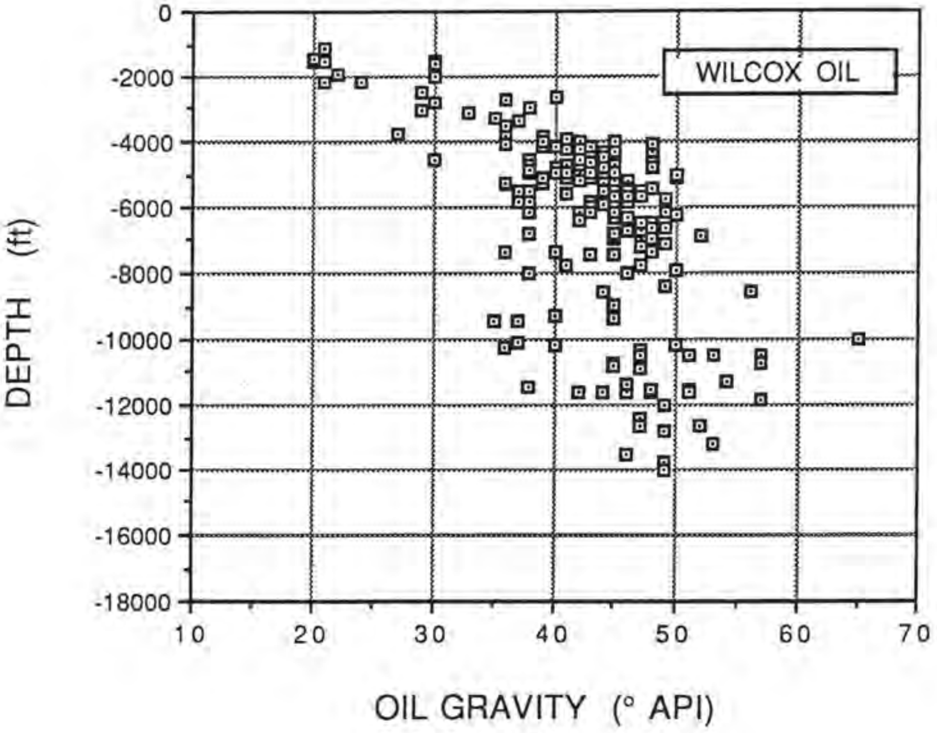

Figure 49. Wilcox oil gravity versus depth plot in the entire study area (data from Mason Map Service and International Oil Scouts Association, 1990; Louisiana Office of Conservation, 1979).

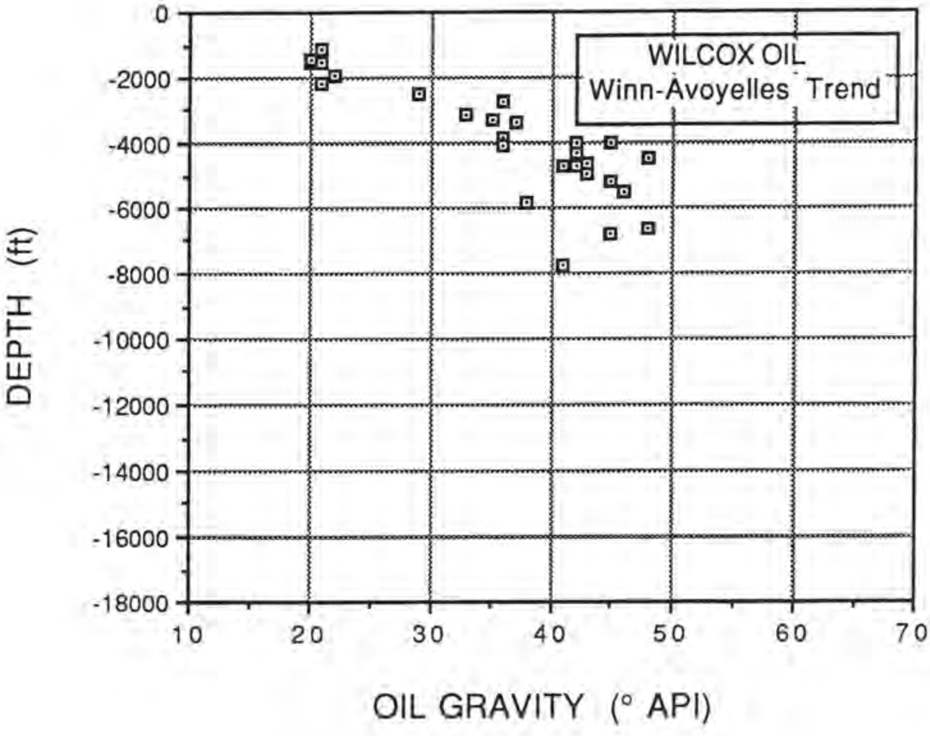

Figure 50. Wilcox oil gravity versus depth plot on "Winn-Avoyelles" trend (see section line Y-Z in Figure 48).

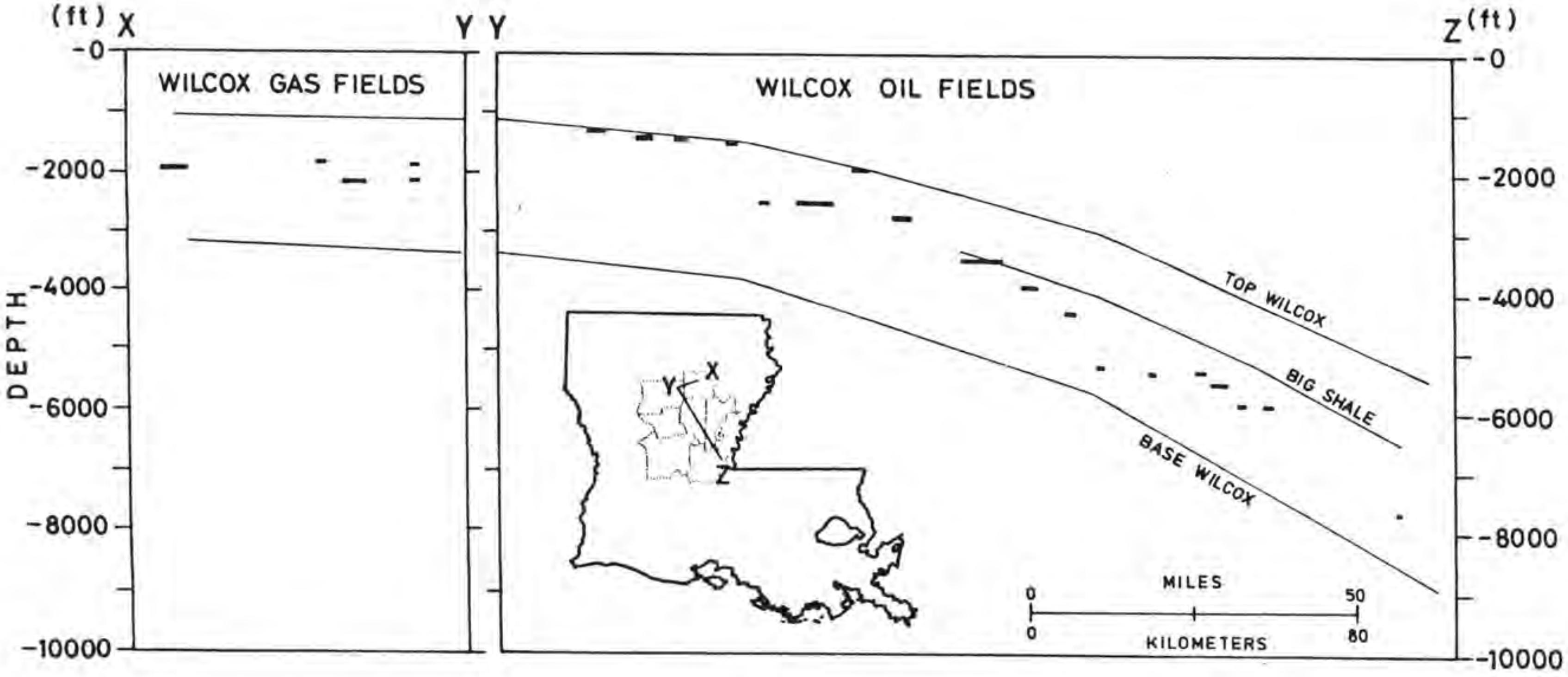

Figure 51. Stratigraphic variation in the top of the producing zones in Wilcox oil and gas reservoirs (data from Mason Map Service and International Oil Scouts Association, 1990; Louisiana Office of Conservation, 1979).

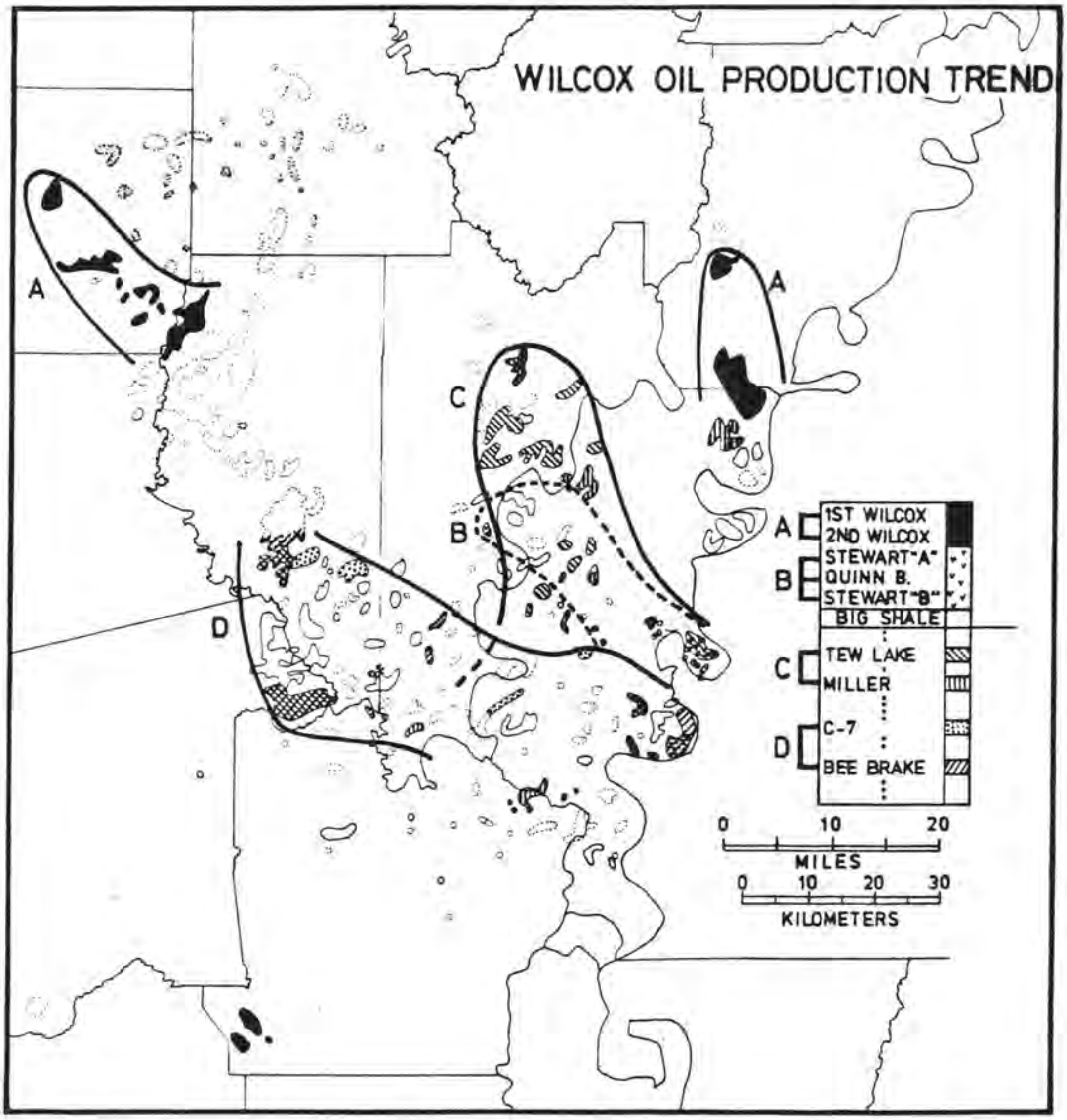

Figure 52. Trend map of selected producing horizons of the Wilcox reservoirs (data from Shreveport Geological Society,1961; Mason Map Service and International Oil Scouts Association, 1990; map from Stanfield et al., 1981).

CONCLUSIONS

Studies of the lithology, stratigraphy, variations of pore fluid properties of the Wilcox Group through Miocene sequence in central Louisiana provide information for understanding processes and patterns of regional fluid flow. In particular the studies in the Wilcox Group can lead to general conclusions on hydrocarbon migration pathways and the occurrences of hydrocarbon accumulations as well as pore water migration and evolution. Salinity, temperature, density, viscosity, and pressure regime of pore water were calculated by modifing pre-existing algorithms.

1) Most of the Miocene through Wilcox section in the study area is hydropressured. The section below approximately 13,000 feet (3960 m) in the Wilcox Group at the southern portion of the study area is geopressured.

2) The SP derived salinities of pore waters of the Wilcox Group in central Louisiana correlate well with reported water analyses.

3) SP derived salinities of pore waters show general increase with depth in the sequence of Miocene through the Wilcox Group in central Louisiana.

4) Density contrasts of pore waters in the study area are low whereas the distinct vertical variation of densities with the maximum at relativelly shallow sections have been reported at vicinities of salt domes in south Louisiana. The lesser variation of densities in central Louisiana may reflect the actual situation or may be attributed to uncertainties in temperature correction method and the density equation in use.

5) The major sources of dissolved salts are most likely salt domes in the northern and southern Louisiana salt dome provinces.

6) The sand-dominated lower Wilcox Group allows pore fluid to move easily and has resulted in more lateral homogenity in salinity compared to salinities in the more shaly upper Wilcox Group.

7) SP derived salinity shows that there is salinity discontinuity between the Wilcox Group and the shallower sedimentary section, which is particularly well defined at the southern part of the study area where shale dominant zone from the Claiborne through Vicksburg groups becomes prominent and thickens. These patterns suggest the existence of two distinct pore water systems, one within the Wilcox and the other within the post-

Wilcox section, which are separated by the shaly zone. These results support large scale pore water migration postulated by Hanor and Sassen (1990) for the post-Wilcox section, whereas the presence of another independent fluid migration path within the Wilcox Group is demonstrated in this study.

8) The shale dominant facies of the Claiborne-Jackson-Vicksburg groups apparently have prevented the vertical migration of the dissolved salt and hydrocarbon from the Wilcox to the overlying sediments. This migration path is consistent with the pore water migration path within the Wilcox Group and the hydrocarbon migration path (Sassen et al., 1988; Hanor and Sassen, 1990; Sassen, 1990) suggested by organic geochemical data.

9) The Big Shale has apparently played a major role to lead Wilcox hydrocarbons into prolific regions in north central Louisiana.

10) A progressive decrease in oil viscosity, which is clearly shown on a plot, due to biodegradation and/or water washing could have enhanced hydrocarbon entrapment.

11) Further understanding of regional fluid flow in the Wilcox would be enhanced by additional water analyses of the downdip

Wilcox; a more accurate density equation; and temperature correction methods which account for cooling effect in individual logging operations rather than the overall empirical equation currently in use.

12) Detailed mapping of isopach of the Big Shale and each local producing sand will help in delineating individual oil traps.

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APPENDIX 1

SPREADSHEET PROGRAM FOR CALCULATION OF PORE FLUID PROPERTIES

The following lists explain the logic used in the spreadsheet program Excel™ working on the Macintosh™. By overwriting the basic calculation parameters on a pre-existing calculation work sheet, subsequent calculation will be done to provide salinity, density, viscosity and so on. In order to save time it is recommended to turn the calculation switch off while entering the data. Explanation of each nomenclature is given in the text. The software described below is copywrighted by M. Funayama.

Data input:

D3 (KB in feet)
G3 (Surface Temperature in °F)
Column B6:B10 (Available Rm in Ω-m)
Column C6:C10 (Available Temperature measured for Rm, in °F)
Column D6:D10 (Available Rmf data)
Column C6:C10 (Available Temperature measured for Rmf, in °F)
Column K6:K10 (Available Depth measured Maximum Temperature in feet)
Column L6:L10 (Available Maximum Temperature in °F)
Column A14:A## (Run Number)
Column B14:B## (Data Top Depth in feet)
Column C14:C## (Data Bottom Depth in feet)
Column J14:J## (SP Amplitude in mV, positive number)
Column K14:K## (SP Reliability, Rank A through C)
Column M14:M## (Ri Readings in Ω-m)

(## refer to the row number of last input)

Data Calculation: The following lists are examples of calculation logic for logging parameters.

Rm75

```
F6    =B6*((C6+7)/82)
```

Rmf75

```
G6    =$D$6*(($E$6+7)/82)
```

Adjusted Rmf75 in terms of its validity (see text for explanation)

```
H6    =IF(D6=" ",-0.064004+0.81172*F6,IF(G6>F6,0.064004+
      0.81172*F6,IF(G6<0.628*F6,-0.064004+0.81172*F6,G6)))
```

Data Calculation: The following lists are examples of calculation logic at row number 6, the first calculation row.

Mid depth

```
D14  =(B14+C14)/2
```

Top depth of the interval from mean sea level

```
E14  =-(B14-$D$3)
```

Bottom depth of the interval from mean sea level

```
F14  =-(C14-$D$3)
```

Mid depth of the interval from mean sea level

```
G14  =(E14+F14)/2
```

Thickness of the interval

```
H14  =C14-B14
```

Bottom hole temperature interpolated using measured B.H.T. data to the interval

```
L14  =IF(A14="#1",$G$3+(($L$6-$G$3)/$K$6)*D14,IF(A14="#2",
     $L$6+(($L$7-$L$6)/$K$7)*D14,IF(A14="#3",$L$7+(($L$8-
     $L$7)/$K$8)*D14,IF(A14="#4",$L$8+(($L$9-$L$8)/$K$9)
     *D14,$L$9+(($L$10-$L$9)/$K$10)*D14))))
```

Rm, mud resistivity at depth

```
N14  =IF(A14="#1",$B$6*(104.77/(L14+6.77)),IF(A14="#2",$B$7*
     (104.77/(L14+6.77)),IF(A14="#3",$B$8*(104.77/(L14+6.77)
     ),IF(A14="#4",$B$9*(104.77/(L14+6.77)),$B$10*(104.77/
     (L14+6.77))))))
```

Ri/Rm

```
O14  =M14/N14
```

Fsp, bed thickness correction factor if applicable

```
P14  =IF(O14<5,1,(((4*O14+8)^(1/3.65)-1.5)/((C14-B14)-
     (((O14+11)/0.65)^(1/6.05))-0.1)+0.95))
```

Fsp, correction for the above correction factor

```
Q14  =IF(P14<=1,1,P14)
```

Corrected SP in terms of bed thickness

```
R14  =IF(P14>=1,P14*J14,J14)
```

Rmfe/Rwe

```
S14  =10^(R14/(60+0.133*L14))
```

Rmfe1

```
T14  =10^(R14*(-1)/(60+0.133*L14))
```

Rmf75 from column F.

```
U14  =IF(A14="#1",$H$6,IF(A14="#2",$H$7,IF(A14="#3",$H$8,
     IF(A14="#4",$H$9,$H$10))))
```

Rmfe2

V14 =IF(U14*(82/(L14+7))>0.1,U14*(82/(L14+7))*0.85,(146*U14*(82/(L14+7))-5)/(337*U14*(82/(L14+7))+77))

Rmfe

W14 =V14/S14

Rw75

X14 =IF(W14>0.12,-(0.58-10^(0.69*W14-0.24)),(77*W14+5)/(146-337*W14))

Rw at depth

Y14 =X14*82/(L14+7)

Salinity, NaCl equivalent in ppm

Z14 =10^(3.562-LOG10(X14-0.0123)/0.955)

Molality

AA14 =(1000*(Z14/10000))/(58.44*(100-Z14/10000))

Intermediate value for calculating density

AB14 =-9.9559*EXP(-4.539*(10^(-3))*AA14)+7.0845*EXP(-1.638*(10^(-4))*AD14) +3.9093*EXP(2.551*(10^(-5))*1)

Corrected temperature in °F

AC14 =L14+(-0.265*(D14/1000-11.7)^2+33)

Corrected temperature in °C

AD14 =(AC14-32)*5/9

In situ density

AE14 =-3.033405+10.128163*(AB14)-8.750567*((AB14)^2)+2.663107*((AB14)^3)

n/nw

AF14 =1+0.0816*AA14+0.0122*AA14^2+0.000128*AA14^3+0.000629*AD14*(1-EXP(-0.7*AA14)) nw, water viscosity at depth

```
AG14    =1.7392-4.9112*(10^(-2))*AD14+7.5121*(10^(-4))
        *(AD14^2)-6.1993*(10^(-6))*(AD14^3)+2.5565*
        (10^(-8))*(AD14^4)-4.1092*(10^(-11))*(AD14^5)
```

n, viscosity

```
AH14    =AF14*AG14
```

Intermediate value for calculating thermal conductivity

```
AI14    =(AD14+273.15)/273.15
```

Intermediate value for calculating thermal conductivity

```
AJ14    =5844.3*AA14/(1000+58.443*AA14)
```

λw, thermal conductivity of water

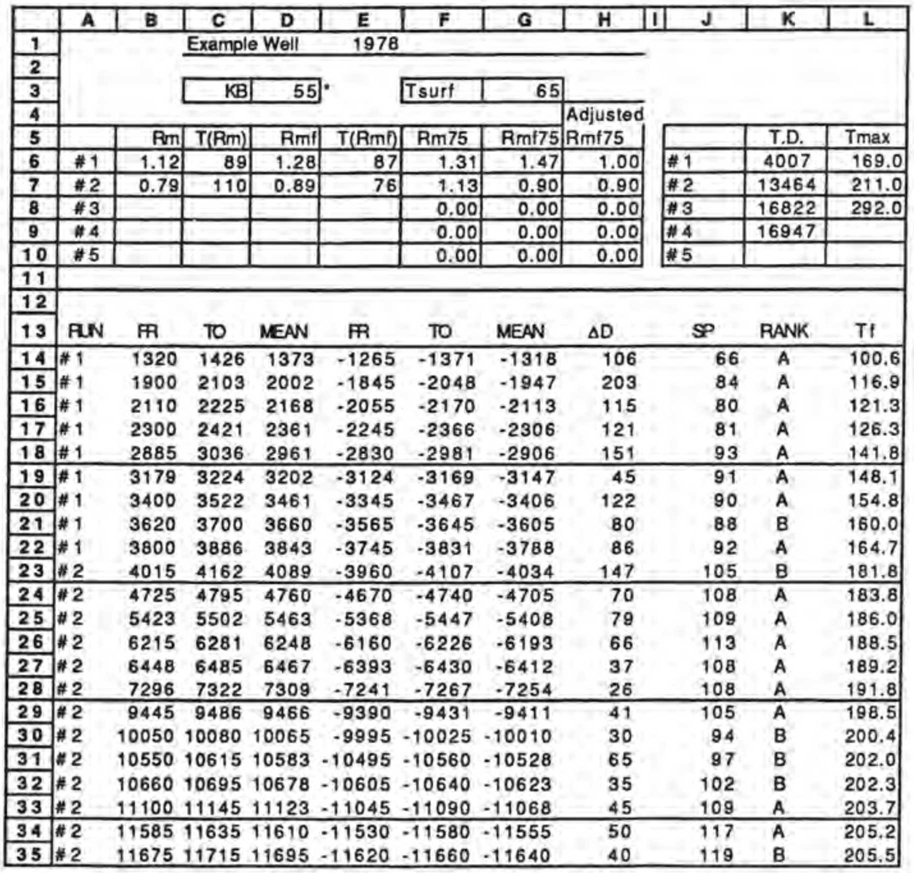
```
AK14    =-0.92247+2.8395*AI14-1.8007*AI14^2+0.52577
        *AI14^3-0.07344*AI14^4
```

λ/λw

```
AL14    =1-(2.3434*10^(-3)-(7.924*10^(-6))*AD14+
        (3.924*10^(-8))*AD14^2)*AJ14+(1.06*10^(-5)-
        (2*10^(-8))*AD14-(1.2*10^(-10))*AD14^2)*AJ14^2
```

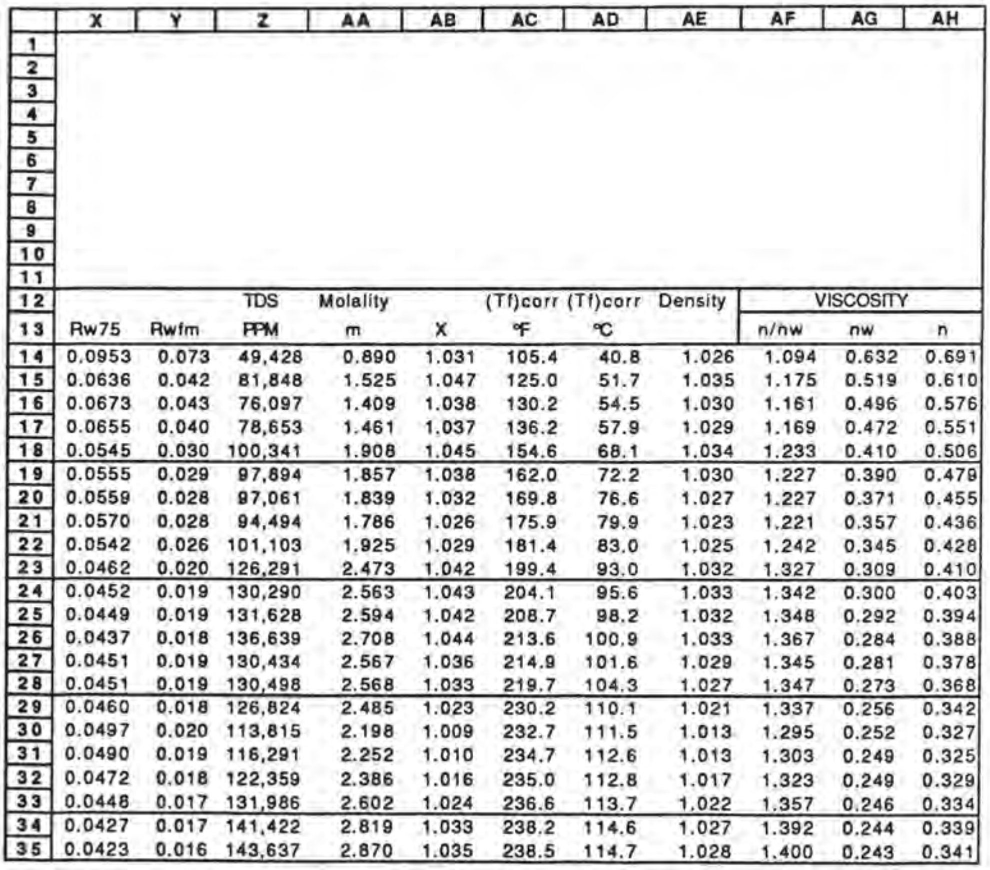
λ, thermal conductivity of pore fluid

```
AM14    =AL14*AK14
```



	A	B	C	D	E	F	G	H	I	J	K	L
1			Example Well		1978							
2												
3			KB	55	'	Tsurf	65					
4								Adjusted				
5		Rm	T(Rm)	Rmf	T(Rmf)	Rm75	Rmf75	Rmf75			T.D.	Tmax
6	#1	1.12	89	1.28	87	1.31	1.47	1.00		#1	4007	169.0
7	#2	0.79	110	0.89	76	1.13	0.90	0.90		#2	13464	211.0
8	#3					0.00	0.00	0.00		#3	16822	292.0
9	#4					0.00	0.00	0.00		#4	16947	
10	#5					0.00	0.00	0.00		#5		
11												
12												
13	RUN	FR	TO	MEAN	FR	TO	MEAN	ΔD		SP	RANK	Tf
14	#1	1320	1426	1373	-1265	-1371	-1318	106		66	A	100.6
15	#1	1900	2103	2002	-1845	-2048	-1947	203		84	A	116.9
16	#1	2110	2225	2168	-2055	-2170	-2113	115		80	A	121.3
17	#1	2300	2421	2361	-2245	-2366	-2306	121		81	A	126.3
18	#1	2885	3036	2961	-2830	-2981	-2906	151		93	A	141.8
19	#1	3179	3224	3202	-3124	-3169	-3147	45		91	A	148.1
20	#1	3400	3522	3461	-3345	-3467	-3406	122		90	A	154.8
21	#1	3620	3700	3660	-3565	-3645	-3605	80		88	B	160.0
22	#1	3800	3886	3843	-3745	-3831	-3788	86		92	A	164.7
23	#2	4015	4162	4089	-3960	-4107	-4034	147		105	B	181.8
24	#2	4725	4795	4760	-4670	-4740	-4705	70		108	A	183.8
25	#2	5423	5502	5463	-5368	-5447	-5408	79		109	A	186.0
26	#2	6215	6281	6248	-6160	-6226	-6193	66		113	A	188.5
27	#2	6448	6485	6467	-6393	-6430	-6412	37		108	A	189.2
28	#2	7296	7322	7309	-7241	-7267	-7254	26		108	A	191.8
29	#2	9445	9486	9466	-9390	-9431	-9411	41		105	A	198.5
30	#2	10050	10080	10065	-9995	-10025	-10010	30		94	B	200.4
31	#2	10550	10615	10583	-10495	-10560	-10528	65		97	B	202.0
32	#2	10660	10695	10678	-10605	-10640	-10623	35		102	B	202.3
33	#2	11100	11145	11123	-11045	-11090	-11068	45		109	A	203.7
34	#2	11585	11635	11610	-11530	-11580	-11555	50		117	A	205.2
35	#2	11675	11715	11695	-11620	-11660	-11640	40		119	B	205.5

	M	N	O	P	Q	R	S	T	U	V	W
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12							Rmfe /				
13	Ri	Rm	Ri/Rm	(Fsp)	Fsp	SSP	Rwe	Rmfe1	Rmf75	Rmfe2	Rwe
14	3.5	1.09	3.20	1.00	1.00	66	7.93	0.13	1.00	0.65	0.08
15	2.1	0.95	2.21	1.00	1.00	84	12.94	0.08	1.00	0.56	0.04
16	2.3	0.92	2.51	1.00	1.00	80	11.24	0.09	1.00	0.54	0.05
17	1.7	0.88	1.93	1.00	1.00	81	11.34	0.09	1.00	0.52	0.05
18	1.5	0.79	1.90	1.00	1.00	93	15.11	0.07	1.00	0.47	0.03
19	1.5	0.76	1.98	1.00	1.00	91	13.86	0.07	1.00	0.45	0.03
20	1.5	0.73	2.07	1.00	1.00	90	13.08	0.08	1.00	0.43	0.03
21	1.4	0.70	1.99	1.00	1.00	88	12.10	0.08	1.00	0.42	0.03
22	1.3	0.68	1.90	1.00	1.00	92	13.28	0.08	1.00	0.41	0.03
23	1.4	0.44	3.19	1.00	1.00	105	17.68	0.06	0.90	0.33	0.02
24	0.7	0.43	1.61	1.00	1.00	108	19.00	0.05	0.90	0.33	0.02
25	1.2	0.43	2.80	1.00	1.00	109	19.33	0.05	0.90	0.33	0.02
26	1.0	0.42	2.36	1.00	1.00	113	21.30	0.05	0.90	0.32	0.02
27	1.5	0.42	3.55	1.00	1.00	108	18.54	0.05	0.90	0.32	0.02
28	2.0	0.42	4.80	1.00	1.00	108	18.32	0.05	0.90	0.32	0.02
29	6.0	0.40	14.88	0.99	1.00	105	16.41	0.06	0.90	0.31	0.02
30	6.8	0.40	17.02	1.01	1.01	95	12.57	0.08	0.90	0.30	0.02
31	9.0	0.40	22.70	0.98	1.00	97	13.08	0.08	0.90	0.30	0.02
32	5.0	0.40	12.63	1.00	1.00	102	14.72	0.07	0.90	0.30	0.02
33	5.8	0.39	14.75	0.99	1.00	109	17.85	0.06	0.90	0.30	0.02
34	5.5	0.39	14.09	0.98	1.00	117	21.89	0.05	0.90	0.30	0.01
35	6.0	0.39	15.39	0.99	1.00	119	23.05	0.04	0.90	0.30	0.01



	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12			TDS	Molality		(Tf)corr	(Tf)corr	Density	VISCOSITY		
13	Rw75	Rwfm	PPM	m	X	°F	°C		n/nw	nw	n
14	0.0953	0.073	49,428	0.890	1.031	105.4	40.8	1.026	1.094	0.632	0.691
15	0.0636	0.042	81,848	1.525	1.047	125.0	51.7	1.035	1.175	0.519	0.610
16	0.0673	0.043	76,097	1.409	1.038	130.2	54.5	1.030	1.161	0.496	0.576
17	0.0655	0.040	78,653	1.461	1.037	136.2	57.9	1.029	1.169	0.472	0.551
18	0.0545	0.030	100,341	1.908	1.045	154.6	68.1	1.034	1.233	0.410	0.506
19	0.0555	0.029	97,894	1.857	1.038	162.0	72.2	1.030	1.227	0.390	0.479
20	0.0559	0.028	97,061	1.839	1.032	169.8	76.6	1.027	1.227	0.371	0.455
21	0.0570	0.028	94,494	1.786	1.026	175.9	79.9	1.023	1.221	0.357	0.436
22	0.0542	0.026	101,103	1.925	1.029	181.4	83.0	1.025	1.242	0.345	0.428
23	0.0462	0.020	126,291	2.473	1.042	199.4	93.0	1.032	1.327	0.309	0.410
24	0.0452	0.019	130,290	2.563	1.043	204.1	95.6	1.033	1.342	0.300	0.403
25	0.0449	0.019	131,628	2.594	1.042	208.7	98.2	1.032	1.348	0.292	0.394
26	0.0437	0.018	136,639	2.708	1.044	213.6	100.9	1.033	1.367	0.284	0.388
27	0.0451	0.019	130,434	2.567	1.036	214.9	101.6	1.029	1.345	0.281	0.378
28	0.0451	0.019	130,498	2.568	1.033	219.7	104.3	1.027	1.347	0.273	0.368
29	0.0460	0.018	126,824	2.485	1.023	230.2	110.1	1.021	1.337	0.256	0.342
30	0.0497	0.020	113,815	2.198	1.009	232.7	111.5	1.013	1.295	0.252	0.327
31	0.0490	0.019	116,291	2.252	1.010	234.7	112.6	1.013	1.303	0.249	0.325
32	0.0472	0.018	122,359	2.386	1.016	235.0	112.8	1.017	1.323	0.249	0.329
33	0.0448	0.017	131,986	2.602	1.024	236.6	113.7	1.022	1.357	0.246	0.334
34	0.0427	0.017	141,422	2.819	1.033	238.2	114.6	1.027	1.392	0.244	0.339
35	0.0423	0.016	143,637	2.870	1.035	238.5	114.7	1.028	1.400	0.243	0.341

	AI	AJ	AK	AL	AM
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12			Therm Cond.		
13	Z	S	λω	λ/λω	λ
14	1.149	4.943	0.632	0.990	0.626
15	1.189	8.185	0.645	0.984	0.635
16	1.200	7.610	0.648	0.985	0.638
17	1.212	7.866	0.651	0.985	0.641
18	1.249	10.035	0.661	0.981	0.648
19	1.264	9.790	0.664	0.981	0.652
20	1.280	9.707	0.667	0.982	0.655
21	1.293	9.450	0.670	0.982	0.658
22	1.304	10.111	0.672	0.981	0.659
23	1.340	12.630	0.677	0.977	0.662
24	1.350	13.030	0.679	0.976	0.662
25	1.359	13.163	0.680	0.976	0.663
26	1.369	13.664	0.681	0.975	0.664
27	1.372	13.044	0.681	0.976	0.665
28	1.382	13.050	0.682	0.976	0.666
29	1.403	12.683	0.684	0.976	0.668
30	1.408	11.382	0.685	0.979	0.670
31	1.412	11.630	0.685	0.978	0.670
32	1.413	12.236	0.685	0.977	0.669
33	1.416	13.199	0.685	0.975	0.668
34	1.419	14.143	0.685	0.974	0.667
35	1.420	14.364	0.686	0.973	0.667

APPENDIX 2

GEOSTATIC RATIO FROM GEORGE GRAPH

The George graph (1965) has provided good approximation in estimating geostatic ratio in southern Louisiana (Figure 13), although his graph has empirical basis rather than theoretical. His graph is simple and easy to use; however, it would have been more convenient if the geostatic ratio were given by formulas. Analysis of George graph has made it possible to reconstruct the graph by simple set of equations.

DERIVATION

First, two regions defined as in Figure A 2-1. In the figure line1, 2, and 3 represent geostatic ratio 1.0, 0.465, and 1.0, respectively.

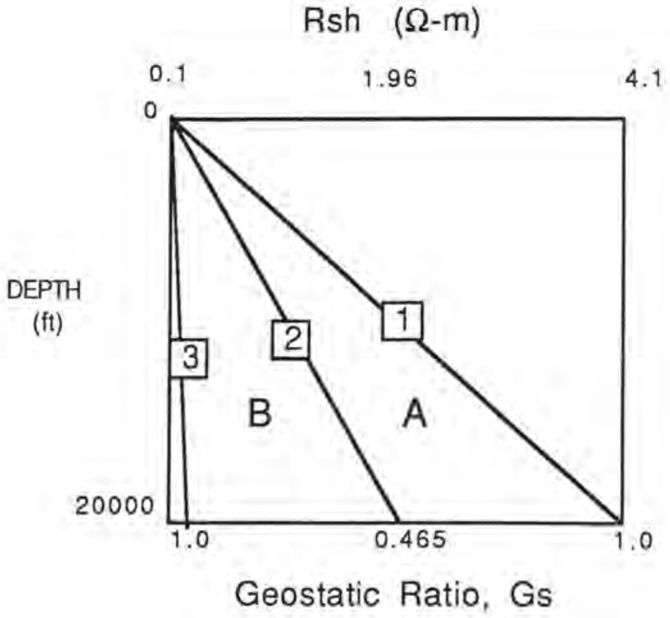


Figure A2-1. Two regions in the George graph.

Region A

In the region A, relationship between shale resistivity, Rsh, and geostatic ratio, Gs, at 20000' can be written as:

$$4Gs = Rsh-0.1 \qquad \text{.........................} \; (A2\text{-}1)$$

or $$Gs = \frac{(Rsh-0.1)}{4} \qquad \text{.........................} \; (A2\text{-}2)$$

Note this relation is true only at 20000'. At that depth, Rsh equals to 1.96 when geostatic ratio is 0.465.

Geostatic ratio lines in the region A can be expressed by a general formula,

$$D = c(Rsh-0.1)$$

Where D is the depth of concern in feet, c is numerical value whose value depends on geostatic ratio.

The line 1 is expressed as:

$$D = \frac{20000(Rsh-0.1)}{(4.1-0.1)}$$

$$= 5000(Rsh-0.1) \qquad \text{......................} \; (A2\text{-}3)$$

Line 2, which is also common line in the region B, is expressed as

$$D = \frac{20000(Rsh-0.1)}{(1.96-0.1)}$$

$$= 10752.7(Rsh-0.1) \qquad \text{......................} \; (A2\text{-}4)$$

General form of geostatic ratio lines in the region A is:

$$D = \frac{20000(Rsh-0.1)}{4Gs}$$

$$= \frac{5000(Rsh-0.1)}{Gs} \qquad \text{.....................} \text{ (A2-5)}$$

or $$Gs = \frac{5000(Rsh-0.1)}{D} \qquad \text{.....................} \text{ (A2-6)}$$

Region B

In the region B, Rsh=0.3 at Gs=0.987 can be read from the George graph. Because increments of both Rsh and geostatic ratio at 20000' are linear, the relationship between Rsh and Gs can be written as Rsh = a Gs + b, where a and b are constants.

Using the relation Rsh=0.3 when Gs=0.987 and D=20000'
Rsh=1.96 when Gs=0.465 and D=20000'

we get the general formula

$$Rsh = -3.180Gs + 3.439 \qquad \text{.........................} \text{ (A2-7)}$$

or $$Gs = \frac{(3.439-Rsh)}{3.180} \qquad \text{.........................} \text{ (A2-8)}$$

Note again this relation is true only at 20000'. When Rsh=0.1 and D=20000', Gs=1.050. These numbers are used in simply numerical means to reconstruct the George Graph.

In this region relationship between Rsh and depth can be expressed as:

$$D = a'Rsh + b'$$

Solving the equation by entering the following values:

$Rsh = 0.259$ when $Gs=1.0$ and $D=20000'$

$Rsh = 0.1$ when $Gs=1.0$ and $D=0'$

we get the depth-Rsh relation at Gs=1.0

$$D = 125786.2(Rsh - 0.1) \qquad \text{.........................} \text{ (A2-9)}$$

or $$Rsh = \frac{D}{125786.2} + 0.1 \qquad \text{......................} \text{ (A2-10)}$$

General form of geostatic lines in the region B is, then,

$$\frac{D\{\overset{Rsh}{(-3.18Gs+3.439)}-0.1\}}{20000} = Rsh-0.1$$

$$D = \frac{20000(Rsh-0.1)}{-3.18Gs+3.339} \qquad \text{.......................} \text{ (A2-11)}$$

or $$Gs = \frac{-20000(Rsh-0.1)}{3.18D} + 1.05 \qquad \text{.....................} \text{ (A2-12)}$$

Geostatic ratio can be given as equations (A2-6) and (A2-12). Using a spreadsheet software, the geostatic ratio, Gs, is given by a statement with if function:

=(IF (5000*(Rsh-0.1)/D-0.465 > =0, 5000*(Rsh-0.1)/D,
-20000*(Rsh-0.1)/3.18*D+1.05))

for Excel™ spreadsheet calculation, for instance.

APPENDIX 3

LIST OF WELLS

Because several logs provide no information of elevation on log headings, "Well File" records stored at the Office of Conservation of State of Louisiana were utilized to fulfill the table. In the column KB, designation of "D", "G", and "*" represents;

D : Derrick floor elevation data, DF, is available. KB = DF + 1' unless specified.

G : Ground level data, GL, is available. KB = GL + 10' unless specified.

* : No data is available. Best estimated from data of nearby wells.

All elevationas, depth, and thickness are in feet.

N/R in column of the top and bottom Wilcox refers to "not reached".

NO.	COMPANY / WELL NAME	PARISH	SECTION	YEAR	LOGGED F/	LOGGED TO	KB	TOP WILCOX		BOT WILCOX		THICKNESS
1	Sohio Petroleum Corp. #1 Grayson	Franklin	37/12N/6E	1968	626	7390	76	2347	-2271	4420	-4344	2073
2	Shell Oil Co. #1 Leslie Sproles	Franklin	34/12N/7E	1956	1016	7489	75	2505	-2430	4822	-4747	2317
3	Nebo Oil Co. Fee #56	Caldwell	33/12N/5E	1956	811	7272	61 D	1993	-1932	4301	-4240	2308
4	Caddo Oil Co. #1 Love	Caldwell	16/11N/2E	1958	308	3934	101 D	1537	-1436	3800	-3699	2263
5	Arkansas Fuel Oil Co. La. Central Lbr. Co. #1	Caldwell	31/12N/3E	1939	90	1873	151	1550	-1399	3780	-3629	2230
6	Atlantic Refining Co. Central B-1	Caldwell	5/11N/3E	1944	2599	5048	182 D	1569	-1387	3866	-3684	2297
7	Justiss-Mears & H. L. Hunt #15-16 I.P.C.O.	Caldwell	15/11N/2E	1974	616	7491	174	1619	-1445	3870	-3696	2251
8	Placid Oil Co. La. Central Minerals #1	Caldwell	16/11N/4E	1952	421	4184	290 *	1870	-1580	4117	-3827	2247
9	Magnolia Petr. Co, Urania #7	Winn	26/11N/1E	1954	304	3861	90 *	1520	-1430	3712	-3622	2192
10	Glen D. Loe WX RA SU G, La Pacific X #35	Winn	26/11N/1E	1985	170	2943	108	1520	-1412	N/R	-	-
11	Jett Drilling Co. #1 Urania Lbr. Co.	Winn	5/11N/1E	1959	827	7008	192 D	1360	-1168	3330	-3138	1970
12	Sonny King Production Co. Clarence Jones #1	Winn	6/10N/1E	1984	345	2880	137	1437	-1300	N/R	-	-
13	Crown Zelleerbach C2 Fee Tract "BC" #1	Winn	12/10N/1W	1983	328	3816	134	1412	-1278	3698	-3564	2286
14	Bodcaw Co. Tremont #B-9	Winn	22/11N/1W	1961	334	3527	178	1338	-1160	3515	-3337	2177
15	Placid Oil Co. #3 IPB LWN	Winn	36/10N/2W	1981	570	4174	175	1490	-1315	3860	-3685	2370
16	Crown Zellebach CZ Fee Tract Av #1	Winn	9/11N/2W	1983	299	3388	95	1164	-1069	3175	-3080	2011
17	H. L. Hunt Goodpine #F-136	Winn	21/10N/2W	1946	241	6402	211 D	1330	-1119	3280	-3069	1950
18	Nebo Oil Co. Nebo Oil Co. Fee #1	Winn	25/9N/3W	1951	405	4454	130 G	1649	-1519	4176	-4046	2527
19	Humble Oil &nRefining Co. Opal Pennington Leach et al. #1	Winn	29/10N/3W	1967	629	8703	260	1307	-1047	3520	-3260	2213
20	Sinclair Oil & Gas Development Co. #1	Winn	30/11N/3W	1958	419	4704	205	740	-535	2074	-1869	1334
21	H. L. Hunt Goodpine #F-13	Winn	19/11N/4W	1942	242	5537	236	705	-469	2470	-2234	1765
22	Brown Paper Mill Co. Fee Well #1	Winn	14/10N/4W	1952	860	5740	300	1149	-849	3208	-2908	2059

NO.	COMPANY / WELL NAME	PARISH	SECTION	YEAR	LOGGED F/	LOGGED TO	KB	TOP WILCOX		BOT WILCOX		THICKNESS
23	Carlee Interests, Incorporation Menie Shows et al. #1	Winn	33/9N/4W	1963	421	4108	182	1452	-1270	4050	-3868	2598
24	Nebo Oil Co. Nebo Fee #57	Winn	22/11N/5W	1956	521	7889	157 D	-	-	2260	-2103	-
25	W. S. Moses Brown Paper Mill #1	Winn	15/9N/5W	1959	407	3819	199	1166	-967	3630	-3431	2464
26	Placid Oil Co. #1 W.F. Taylor	Natchitoches	85/6N/5W	1962	1008	9459	107	2717	-2610	6020	-5913	3303
27	Placid Oil Co. Atkins #1	Natchitoches	47/6N/5W	1965	277	15034	126	2468	-2342	5670	-5544	3202
28	British American Oil Co. Bentley Lbr. Co.	Natchitoches	9/5N/5W	1952	680	7200	304	3494	-3190	7003	-6699	3509
29	Wilhite, Seay & Bryans et al. Union Sawmill Co. #1	Natchitoches	14/5N/7W	1952	516	6600	205 D	3080	-2875	6570	-6365	3490
30	Hunt Industries Boise Southern #1	Natchitoches	33/8N/9W	1973	88	17324	419	-	-	2630	-2211	-
31	W. T.Burton A. J. Hodges	Sabine	24/5N/9W	1953	1046	7098	335 D	3021	-2686	6580	-6245	3559
32	A. J. Hodges Industries Inc. Hodges Gardens #1	Sabine	28/5N/10W	1966	1829	12866	348	2410	-2062	5950	-5602	3540
33	Texaco Inc. James A. Lee #1	Sabine	6/4N/10W	1968	2506	9245	260	2500	-2240	6040	-5780	3540
34	A. J. Hodges Ind. Inc. , et al. Crosby Chemical Co., Inc. #1	Sabine	18/4N/10W	1963	816	6611	397	2864	-2467	6520	-6123	3656
35	Carter Oil Co. Pickering Lbr. Co. #1	Sabine	14/4N/11W	1945	505	9485	387 D	2520	-2133	6155	-5768	3635
36	Carter Oil Co. Wyatt #1	Sabine	15/5N/12W	1952	169	8512	281 D	240	41	3194	-2913	2954
37	Carter Oil Co. R. O. Ammons	Sabine	16/5N/12W	1953	20	4604	225 D	183	42	3056	-2831	2873
38	Superior Oil Co. J. A. Bentley Lumber Co. #1	Vernon	19/4N/5W	1984	101	15860	243	4190	-3947	8000	-7757	3810
39	Pan American Petr. Corp. William T. Burton Ind. #1	Vernon	4/1S/5W	1963	3019	17627	248 D	7212	-6964	11150	-10902	3938
40	Magnolia Petr. Co. Pickering Lbr. Co. #1	Vernon	8/3N/8W	1954	191	8525	346 D	4302	-3956	8140	-7794	3838
41	Magnolia Petr. Co. La. Long Leaf Lbr. Co. #1	Vernon	15/4N/9W	1948	105	12466	407 G	3420	-3013	7160	-6753	3740
42	Pan American Petr. Co. #1 Pitre-Graham	Vernon	2/15/9W	1962	2248	15550	340 D	6676	-6336	11000	-10660	4324
43	Jett Drilling Co. Inc. Central Coal & Coke #1	Vernon	30/3N/10W	1959	1775	11506	301 G	3954	-3653	7922	-7621	3968
44	Humble Oil & Refg. Co. Anderson Post Lbr. Co. #1	Vernon	11/2N/11W	1947	94	12160	372 D	4400	-4028	8447	-8075	4047

NO	COMPANY / WELL NAME	PARISH	SECTION	YEAR	LOGGED F/	LOGGED TO	KB	TOP WILCOX		BOT WILCOX		THICKNESS
45	Gulf Oil Corp. Lutcher & Moore Lumber Co. #A-1	Vernon	22/1N/11W	1970	118	15707	165	5320	-5155	9680	-9515	4360
46	Lamar Hunt Kibby Lumber Co. #1	Vernon	5/1N/11W	1974	1813	9155	123	4765	-4642	9035	-8912	4270
47	Bodcaw Co. Bodcaw Fee Lgt #4	Grant	15/9N/1W	1973	485	11750	111	1595	-1484	4150	-4039	2555
48	La. Hunt Petr. Corp. IPB LGT #23	Grant	28/9N/2W	1985	940	4508	170	1800	-1630	4361	-4191	2561
49	La. Hunt Petr. Corp. IPB LGT #31	Grant	10/8N/1W	1983	812	4997	165	2070	-1905	4762	-4597	2692
50	Justiss-Mears Oil Co. Georgia_Pacific #13	Grant	32/8N/1E	1971	418	5035	111	2320	-2209	4999	-4888	2679
51	La. Hunt Petr. Corp. IPB LGT #29	Grant	13/8N/2W	1985	810	4707	176	2053	-1877	N/R	-	-
52	XB Energy & Gulf States Expl. #1 Manville Forest Prod. Corp.	Grant	8/8N/3W	1981	263	11991	187	1750	-1563	4407	-4220	2657
53	Ramrod Prod. Co. #6 International Petr. Co.	Grant	1/8N/4W	1981	407	4399	205	1615	-1410	4268	-4063	2653
54	Truman & Turman Roy O.. Martin #2	Grant	36/8N/5W	1981	312	3501	144	1660	-1516	N/R	-	-
55	Wenert Trich 1 Roy O. Martin	Grant	36/8N/5W	1979	332	3666	137	1666	-1529	N/R	-	-
56	Kenilworth Oil Corp. Dyson #1	Grant	29/8N/5W	1951	500	4509	113 D	1536	-1423	4410	-4297	2874
57	Bates & Cornell Paul A. Duke #1	Grant	9/7N/4W	1953	461	6019	127 D	2032	-1905	5135	-5008	3103
58	Adam Petr. Services , Inc. Fletcher #6	Grant	9/7N/4W	1986	425	4455	103	2080	-1977	N/R	-	-
59	Ramrod Prod. Co. #1 Jackson et al.	Grant	38/7N/4W	1980	413	4559	100	2656	-2556	N/R	-	-
60	General Crude #1 Sandifer	Grant	36/7N/3W	1979	3519	13006	200	-	-	6010	-5810	-
61	Moses & New and Sidney Hughes U.S.A. #D-3	Grant	29/7N/2W	1959	531	6173	196 D	2732	-2536	5752	-5556	3020
62	Kadane Oil Co. 1 Beard-USA	Grant	22/7N/2W	1979	539	5968	241	2780	-2539	N/R	-	-
63	David K. Brooks et al. U.S.A. #1	Grant	4/7N/1W	1952	650	5024	190 *	2480	-2290	N/R	-	-
64	Justiss-Mears Oil Co. Georgia Pacific #26-1	Grant	26/7N/1E	1971	402	5023	189	2640	-2451	N/R	-	-
65	Sidney H. Hughes USA #1	Grant	21/6N/1E	1958	512	5999	176	3397	-3221	N/R	-	-
66	Ramrod Prod. #1 Pollock	Grant	27/6N/1W	1969	623	6220	207 D	3570	-3363	N/R	-	-

NO.	COMPANY / WELL NAME	PARISH	SECTION	YEAR	LOGGED F/	LOGGED TO	KB	TOP WILCOX		BOT WILCOX		THICKNESS
67	Seabord Oil Co. Joe Shorter #1	Grant	40/6N/2W	1952	100	11008	153	3427	-3274	6842	-6689	3415
68	Placid Oil Co. Edenborn #B-1	Grant	13/6N/3W	1964	515	6360	113 D	3010	-2897	6300	-6187	3290
69	Columbian Carbon Co. Molly Duncan #1	Grant	51/6N/3W	1953	1210	6818	104 D	3257	-3153	6610	-6506	3353
70	Justiss-Mears Oil Co., Inc. #1 Cupit	La Salle	27/11N/4E	1974	517	7440	228 D	2067	-1839	4773	-4545	2706
71	Placid Oil Co. La. Central #126	La Salle	15/10N/4E	1947	50	8920	226 D	2296	-2070	4774	-4548	2478
72	Placid Oil Co. #151 La. Central	La Salle	31/10N/3E	1957	581	6342	184 D	1720	-1536	4000	-3816	2280
73	Justiss-Mears Oil Co. et al. #E-1 Urania Lumber Co.	La Salle	22/10N/2E	1963	525	7735	106 D	1588	-1482	3900	-3794	2312
74	Magnolia Petr. Co. Urania Lbr. Co. #21-s	La Salle	12/10N/1E	1955	312	3854	100 *	1544	-1444	3822	-3722	2278
75	H. L. Hunt Goodpine #F-19	La Salle	36/9N/4E	1941	617	5457	208 D	2780	-2572	5342	-5134	2562
76	H. L. Hunt Goodpine #F-137	La Salle	20/9N/4E	1947	1581	8462	165 *	2464	-2299	4965	-4800	2501
77	Lammar Hunt #1 Bodcaw	La Salle	20/9N/2E	1963	1374	7576	165	2515	-2350	5195	-5030	2680
78	Crown Zellerbach CZ Fee Tract "AZ" #2	La Salle	2/9N/1E	1983	346	3897	68	1512	-1444	3829	-3761	2317
79	Placid Oil Co. Goodpine #F-15	La Salle	15/8N/4E	1941	626	5405	207 *	2810	-2603	5348	-5141	2538
80	H. L. Hunt Nebo Oil Co #F-145	La Salle	40/8N/3E	1949	513	5086	212 D	2500	-2288	5040	-4828	2540
81	Placid Oil Co. Goodpine #F-17	La Salle	2/8N/3E	1941	578	5052	205 D	2450	-2245	4923	-4718	2473
82	H. L. Hunt #F-148 Nebo Oil Co.	La Salle	6/8N/3E	1949	335	4940	182 D	2168	-1986	4590	-4408	2422
83	Placid Oil Co. Nebo Oil Co. #F-129	La Salle	25/8N/2E	1945	50	7481	178 D	2261	-2083	4860	-4682	2599
84	Hunt Oil Co. La Salle Parish School Board #A-1	La Salle	16/7N/4E	1952	444	5003	210 *	2668	-2458	N/R	-	-
85	H. L. Hunt Nebo Oil Co. #A-49	La Salle	10/7N/3E	1947	1945	8400	176 D	2520	-2344	5120	-4944	2600
86	H. Murphy La. Delta Lbr. Co. #1	La Salle	36/6N/4E	1947	35	8996	59	3340	-3281	6270	-6211	2930
87	Tensas Delta Land Co. T-123 Exxon Tensas Delta	La Salle	22/6N/4E	1978	445	5005	59	3147	-3088	N/R	-	-
88	Hunt Oil Co. Humble-Tensas Delta #D-1	La Salle	29/6N/4E	1988	606	13745	68	3010	-2942	5740	-5672	2730

NO.	COMPANY / WELL NAME	PARISH	SECTION	YEAR	LOGGED F/	LOGGED TO	KB	TOP WILCOX		BOT WILCOX		THICKNESS
89	Placid Oil Co. #C-28 State Lease #1462	La Salle	21/6N/3E	1968	742	13927	62	2692	-2630	5532	-5470	2840
90	Hunt Oil Co. La. delta #29	La Salle	25/5N/4E	1950	530	6006	54	3837	-3783	N/R	-	-
91	Hassie Hunt Trust #D-2 Humble-Tensas Delta	La Salle	22/5N/4E	1969	617	7393	66	3580	-3514	6676	-6610	3096
92	Hunt Oil Co. H-234 Exxon-Tensas Delta	La Salle	21/5N/4E	1975	768	6008	56	3572	-3516	N/R	-	-
93	Tensas Delta Land Co. Exxon-Tensas Delta #T-128	La Salle	3/4N/4E	1976	453	5996	56	3920	-3864	N/R	-	-
94	Bell Drilling Co. W. S. Peck #1	Catahoula	33/11N/8E	1939	346	5025	78 D	3010	-2932	N/R	-	-
95	Sohio Petr. C. La Salle Land Co. #1	Catahoula	19/11N/5E	1948	40	8113	215 D	2230	-2015	4683	-4468	2453
96	H. J. Strief Peck #2	Catahoula	42/10N/8E	1950	1421	8688	79 D	3408	-3329	5877	-5798	2469
97	Jett Drilling Co. La. Central Lbr. Co. #1	Catahoula	10/10N/7E	1957	1043	8463	231 D	3070	-2839	5676	-5445	2606
98	N. B. Hunt & Lamar Hunt #8 La. Central Mineral	Catahoula	28/10N/7E	1955	451	5800	193 D	3150	-2957	5755	-5562	2605
99	A. J. Hodges Ind., Inc. #B-1 La. Centarl	Catahoula	10/10N/6E	1957	665	7954	55	2713	-2658	5170	-5115	2457
100	A. J. Hodges Ind., Inc. et al. #A-2 La. Central	Catahoula	24/10N/5E	1957	665	8047	192 D	2804	-2612	5250	-5058	2446
101	Ted Wener #1 R. J. Wilson	Catahoula	14/9N/7E	1952	1770	8600	60	3110	-3050	5836	-5776	2726
102	Mobley & Stephens #1 Crawford	Catahoula	22/9N/6E	1960	413	4995	63 D	2992	-2929	N/R	-	-
103	F. H. Shortridge et al. #1 La. Central	Catahoula	42/9N/5E	1955	509	5778	166 D	3016	-2850	5554	-5388	2538
104	Penrod Drilling Co. P. L. Mitchell #2	Catahoula	34/8N/7E	1947	107	9514	69 D	3487	-3418	6458	-6389	2971
105	Texas Crude Co. #1 R. M. Taliaferro	Catahoula	2/8N/6E	1952	1382	8717	70 D	3141	-3071	5940	-5870	2799
106	Sinclair Prairie Oil Co. Tensas Delta #1	Catahoula	10/8N/5E	1957	657	6028	57 D	3030	-2973	5598	-5541	2568
107	Como Drilling Co. E. C. Wentworth #1 Frietz	Catahoula	37/7N/6E	1954	560	5998	66 D	3444	-3378	N/R	-	-
108	C. H. Lyons O. A. Hargis #1	Catahoula	18/7N/6E	1941	562	6344	67 D	3376	-3309	6212	-6145	2836
109	Placid Oil Co. #3 Tensas Delta	Catahoula	4/7N/5E	1965	525	5818	54	3110	-3056	5788	-5734	2678
110	Placid Oil Co. #2 Grant Timber & MFG. Co.	Catahoula	29/6N/6E	1941	992	6570	55 D	3780	-3725	N/R	-	-

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111	Hunt Oil Co. La. Delta #80	Catahoula	25/6N/5E	1952	433	6000	50	3683	-3633	N/R	-	-
112	Hassie Hunt Trust #28 Humble-Tensas Delta	Catahoula	34/6N/5E	1970	790	6012	51	3572	-3521	N/R	-	-
113	Justiss-Mears Oil Co., Inc. A. I. Hunt-State #1	Catahoula	25/5N/6E	1966	440	6439	62	4440	-4378	N/R	-	-
114	New & Hughes Drilling Co. Missiana "DC" #1	Catahoula	30/5N/6E	1979	533	6141	50	4157	-4107	N/R	-	-
115	Justiss-Mears Oil Co., Inc. #H-1 Levee District #4609 S. L.	Catahoula	35/5N/5E	1967	550	6408	62	4207	-4145	N/R	-	-
116	Placid Oil Co. Farrier et al., #2	Catahoula	17/4N/6E	1950	642	7509	62	4618	-4556	N/R	-	-
117	Placid Oil Co. Farrier #4	Catahoula	12/4N/5E	1951	511	7514	57 D	4380	-4323	N/R	-	-
118	Fortune Gas & Oil, Inc. #1 Missiana "A"	Catahoula	1/4N/5E	1977	485	6396	54	4290	-4236	N/R	-	-
119	New & Hughes Drilling Co. #1 Missiana "B"	Catahoula	12/4N/5E	1979	580	6501	56	4450	-4394	N/R	-	-
120	Ross Prod. Co. Zwahlem & Raish #1 Humble-Tensas Delta	Catahoula	13/4N/5E	1972	577	6027	53	4550	-4497	N/R	-	-
121	Lamar Hunt & Olin Oil & Gas Corp. #A-1 Tensas Delta	Catahoula	3/4N/5E	1959	458	6765	54 D	4204	-4150	6742	-6688	2538
122	Hassie Hunt Trust #1 Humble-Tensas Delta	Catahoula	4/4N/5E	1969	526	6211	52	4130	-4078	N/R	-	-
123	Hunt Oil Co. La. Delta #28	Catahoula	30/4N/5E	1950	630	7460	53 D	4550	-4497	N/R	-	-
124	Hunt Oil Co. La. Delta #62	Catahoula	9/3N/5E	1951	548	8006	52 D	4896	-4844	N/R	-	-
125	Justiss-Mears Oil Co. Lucy D. Magoun #1	Concordia	23/7N/7E	1952	700	6991	65 D	3738	-3673	6860	-6795	3122
126	Sid W. Richardson Madison Oil & Deve. #A-1	Concordia	34/6N/9E	1945	396	10602	60 *	4217	-4157	7480	-7420	3263
127	Hunt Oil Co. et al. John Dale Jr. #1	Concordia	8/6N/8E	1949	1792	10260	60 D	4029	-3969	7530	-7470	3501
128	Richardson & Bass (La. Account) Madison Oil & Dev. Co.	Concordia	22/6N/8E	1951	407	8026	62 D	4200	-4138	7808	-7746	3608
129	Frank & George Frankel F. M. Thomas #1	Concordia	3/6N/7E	1952	1843	7164	63 D	3868	-3805	6990	-6927	3122
130	Justiss-Mears Drilling Co. J. Riley Wilson #1	Concordia	17/6N/7E	1951	488	6520	63 D	3920	-3857	N/R	-	-
131	Olin Oil & Gas Corp. #1 J. M. Wilson	Concordia	19/6N/7E	1961	600	6515	58	3930	-3872	N/R	-	-
132	Fletcher Drilling Co. Forman #1	Concordia	25/6N/6E	1951	410	7024	61 D	3943	-3882	N/R	-	-

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133	Barnett Serio Cox #1	Concordia	34/6N/6E	1952	600	6500	61 D	3870	-3809	N/R	-	-
134	Pan American Petr. Corp. Angelina Lumber Co. #E-1	Concordia	22/5N/7E	1967	1023	7219	54 D	4490	-4436	N/R	-	-
135	Zach Brooks-Justiss-Mears #A-1 Conn	Concordia	34/5N/6E	1953	725	7519	52	4460	-4408	N/R	-	-
136	Adco Prod. Co., Inc. I Mobil Feem	Concordia	6/1N/6E	1979	861	8623	49	6280	-6231	N/R	-	-
137	Pan American Petr. Corp. #5 Sam E. Broadhead	Avoyelles	29/4N/4E	1962	500	6502	57	4315	-4258	N/R	-	-
138	Pan American Petr. Corp. #4 Sam E. Broadhead	Avoyelles	29/4N/4E	1962	500	6500	56	4359	-4303	N/R	-	-
139	Justiss-Mears Oil Co. #1 Broadhead 11-5	Avoyelles	27/4N3E	1965	452	6428	61	4290	-4229	N/R	-	-
140	J. J. Zwahlen & H. D. Raish #1 Sam E. BroadHead	Avoyelles	37/4N/3E	1976	628	6391	64	4330	-4266	N/R	-	-
141	Adco Prod. Co. V. Monta Currie #1 Sam E. Broadhead	Avoyelles	37/4N/3E	1980	637	6525	62	4360	-4298	N/R	-	-
142	K. B. Keary, Jr. & P. J. Gay Roy O. Martin et al. #1	Avoyelles	14/3N/6E	1958	1427	8730	54 D	5185	-5131	8640	-8586	3455
143	K. B. Keary, Jr. & P. J. Gay #1 Snowden-Elder Realty Co.	Avoyelles	30/3N/6E	1958	1408	8757	58 D	5297	-5239	N/R	-	-
144	Hunt Oil Co. Gustave Brouillet Unit #1	Avoyelles	8/3N/4E	1951	1030	9184	64	5345	-5281	9021	-8957	3676
145	Placid Oil Co. Dupuy #1	Avoyelles	8/3N/4E	1978	85	17202	80	4715	-4635	8280	-8200	3565
146	Hunt Oil Co., Berkshire Oil Co. Ellis Laborde #1	Avoyelles	33/3N/3E	1949	1153	8897	97 D	5080	-4983	8790	-8693	3710
147	Pan American Corp. & D.D. Feldman S. W. Improvement Co. Blk 1 Well #1	Avoyelles	1/2N/6E	1952	1701	9921	55 *	6130	-6075	9900	-9845	3770
148	Pan American Petr. Corp. #G-2 S. W. Improvement Co.	Avoyelles	20/2N/6E	1964	529	8697	50	6072	-6022	N/R	-	-
149	Pan American Petr. Corp. #5 Elder Realty Co., Inc.	Avoyelles	7/2N/6E	1963	528	8235	53 D	5753	-5700	N/R	-	-
150	Pan American Petr. Corp. #G-1 S.W. Improvement Co.	Avoyelles	19/2N/6E	1964	502	8698	56	6080	-6024	N/R	-	-
151	Pan American Petr. Corp. S.W. Improvement Co. #G-3	Avoyelles	29/2N/6E	1964	509	8902	55	6184	-6129	N/R	-	-
152	Pan American Petr. Corp. C. R. Laborde #1	Avoyelles	36/2N/5E	1950	1429	9705	65 D	6289	-6224	N/R	-	-
153	Joe. F. Belt Thompson & Katz #1	Avoyelles	23/2N/5E	1940	543	6552	57	6080	-6023	N/R	-	-
154	ADCO Prod. Co. Inc. #1 J. T. Everhart	Avoyelles	34/2N/5E	1979	895	8506	56	6247	-6191	N/R	-	-

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155	Ramrod Prod. Co. H.M. Hanner #1	Avoyelles	10/2N/5E	1966	728	7915	58	5608	-5550	N/R	-	-
156	Placid Oil Co. #1 Thompson Katz	Avoyelles	4/2N/5E	1942	987	7800	54 D	5537	-5483	N/R	-	-
157	Justiss-Mears Oil Co., Inc. R. Ollin #C-1	Avoyelles	33/2N/5E	1963	610	8978	54	6197	-6143	N/R	-	-
158	Justiss-Mears Oil Co., Inc. #B-1 B. Quinn	Avoyelles	29/2N/5E	1984	617	8938	54	6050	-5996	N/R	-	-
159	Shell Oil Co. Shell-Ashland, La. Moreau #1	Avoyelles	82/2N/4E	1964	127	17027	96	5670	-5574	9540	-9444	3870
160	Bateman Drilling Co. Florence Bernard Unit #1	Avoyelles	26/2N/3E	1960	1150	9094	85 *	6256	-6171	N/R	-	-
161	Hunt Oil Co. B. F. Lemoine #1	Avoyelles	26/1N/6E	1951	1267	10693	60 D	6920	-6860	10226	-10166	3306
162	J. E. Thornhill et al. L. M. Holmes #1	Avoyelles	34/1N/6E	1964	638	9272	61 *	7030	-6969	N/R	-	-
163	Lyle Cummins Bordelon Unit #1	Avoyelles	9/1N/6E	1947	1091	7516	61 D	6530	-6469	N/R	-	-
164	Pan American Petr. Corp. #3 F. Joffrion	Avoyelles	18/1N/6E	1963	554	9088	55 D	6710	-6655	N/R	-	-
165	Jamajo Industries, Inc. #A-1 Walker T. Nolin	Avoyelles	26/1N/5E	1968	818	9294	55	6970	-6915	N/R	-	-
166	Justiss-Mears Oil Co. , Inc. et al #E-1 Bertha Quinn	Avoyelles	8/1N/5E	1964	635	9001	54	6472	-6418	N/R	-	-
167	W. A. Moncrief Vergie Descant #1	Avoyelles	31/1N/4E	1951	1840	10009	63	7460	-7397	N/R	-	-
168	Campbell & Associates El;mer J. Descant #1	Avoyelles	31/1N/4E	1976	1820	10987	76	7460	-7384	N/R	-	-
169	W. A. Moncrief Roy O. Martin "D" #1	Avoyelles	35/1S/5E	1978	4050	16997	54	8200	-8146	12220	-12166	4020
170	Lamar Hunt Trust Estate Max M. Merrick #1	Avoyelles	13/1S/4E	1951	1284	11576	60 *	7772	-7712	11354	-11294	3582
171	Lamar Hunt Trust Estate Haas Investment Co. #1	Avoyelles	36/1S/4E	1951	1278	11832	60 *	8260	-8200	11827	-11767	3567
172	Florida Gas Exploration Co. Fred P. Newton #1	Avoyelles	35/1S/3E	1979	278	16504	60 *	8615	-8555	12100	-12040	3485
173	Sinclair Oil & Gas Co. Turner Lumber Co. #1	Avoyelles	29/2S/6E	1951	2733	12812	85 *	8758	-8673	12490	-12405	3732
174	W. A. Moncrief W. A. Moncrief #1	Avoyelles	20/2S/6E	1985	4422	16566	41 G	8710	-8669	12350	-12309	3640
175	Gulf Oil Corp. R. O. Martin, Jr. "C" #1	Avoyelles	18/2S/6E	1977	4071	18528	53	8630	-8577	12210	-12157	3580
176	Gulf Oil Corp. R. O. Martin, Jr. "A" #1	Avoyelles	9/2S/5E	1976	3998	18996	51	8578	-8527	11735	-11684	3157

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177	W. A. Moncrief M. J. Ducote #1	Avoyelles	8/2S/5E	1978	4001	16637	58	8540	-8482	12065	-12007	3525
178	Gulf Oil Co. #1 Wright	Avoyelles	1/2S/4E	1977	4030	18407	56	8410	-8354	11960	-11904	3550
179	Florida Exploration Co. LEO Morrow #1	Avoyelles	23/2S/4E	1979	334	17458	71	8930	-8859	12405	-12334	3475
180	Southland Royalty Co. Pearce-Kavanaugh Farms Inc. #1	Avoyelles	1/2S/3E	1957	1817	11671	66 D	8536	-8470	N/R	-	-
181	Humble Oil & Refg. Co. Frank Turner #1	Avoyelles	5/2S/3E	1951	107	12108	71 D	8660	-8589	N/R	-	-
182	Tribal Oil Co. Harper-Hunt #1	Avoyelles	7/2S/3E	1971	1809	10027	70	8650	-8580	N/R	-	-
183	S. W. Richardson Haars Investment Co. #1-c	Avoyelles	7/2S/3E	1941	1973	11930	66 D	8516	-8450	N/R	-	-
184	Shell Oil Co. C. K. Kirklin Well #1	Avoyelles	18/2S/3E	1979	344	16060	31	8565	-8534	11940	-11909	3375
185	The Atlantic Refg. Co. Stokes Unit #1	Avoyelles	10/2S/2E	1949	3090	11202	62 D	8494	-8432	N/R	-	-
186	Barnet Serio & Billups Petr. Co. R. Provosty et al. #1	Rapides	35/6N2E	1951	550	5878	80 *	3023	-2943	N/R	-	-
187	Roland S. Bond J. A. O'Neil Est. #1	Rapides	20/5N/3E	1942	604	6006	86 D	3370	-3284	N/R	-	-
188	Atlantic Logan & McKeeper 1 Edgar R. Slay et al.	Rapides	1/5N/2E	1969	715	12932	80 D	3042	-2962	6170	-6090	3128
189	Great S. Oil & Gas Co. & Mcalester Fuel Co. Lee Lumber C0. #D-1	Rapides	38/5N/2E	1966	617	6202	123	3940	-3817	N/R	-	-
190	W. L. Gun Mrs. Janie Moore et al. #1	Rapides	12/5N/1W	1964	681	6212	167	3800	-3633	N/R	-	-
191	Cordell, Cordell & Ballard Estelle Smith #1	Rapides	36/5N/2W	1957	445	6220	90 G	4098	-4008	N/R	-	-
192	Siesta Oil & Expl. Co. #2 Bently Lumber Co.	Rapides	34/5N/4W	1966	536	6888	158	3934	-3776	N/R	-	-
193	W. T. Burton Brntley Lbr. Co. #1	Rapides	33/5N/5W	1947	50	11054	37 G	3758	-3721	7427	-7390	3669
194	Fortune Gas & Oil Eota #2	Rapides	5/4N/4E	1978	504	5884	52	3820	-3768	N/R	-	-
195	John T. Palmer C. L. Robertson	Rapides	5/4N/3E	1979	1192	9817	95	3745	-3650	7030	-6935	3285
196	Kemp DRLG Co. & D. D. Feldman O. & G. Co. Maria Brousek #1	Rapides	22/4N/2E	1951	1013	7028	105 D	4570	-4465	N/R	-	-
197	E. F. Neely & Jett DRLG Co. J. B. Smith #1	Rapides	15/4N/1E	1956	625	7002	154 D	4630	-4476	N/R	-	-
198	Transco Expl. Co. Walter E. Carter #1	Rapides	63/4N/2W	1981	72	11799	88 D	4698	-4610	8600	-8512	3902

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199	Beard Oil Co. #1 J. A. Dunham	Rapides	36/4N/3W	1975	600	7197	159	4682	-4523	N/R	-	-
200	David Grow Bently Lumber Co. #5	Rapides	3/4N/4W	1965	660	7116	167	4000	-3833	N/R	-	-
201	Socony-Mobil Oil Co., Inc. Bentley Lbr. Co. #A-1	Rapides	11/4N/5W	1964	90	16011	241	4130	-3889	7910	-7669	3780
202	Caroline Hunt Sands C. Keller #1	Rapides	40/3N/1E	1951	779	8510	77 D	5213	-5136	N/R	-	-
203	R. L. Roland Lodi #1	Rapides	9/3N/1W	1955	306	5252	103 D	4972	-4869	N/R	-	-
204	Beard Oil Co. USA 6-2 #1	Rapides	2/3N/3W	1973	741	8528	155	4953	-4798	N/R	-	-
205	Beard Oil Co. #1 Blm 26-5	Rapides	26/3N/3W	1971	722	8604	230	5596	-5366	N/R	-	-
206	Domestic Oil Producers, Inc. #1 Pardee	Rapides	18/3N/4W	1981	1401	8937	179	5012	-4833	8910	-8731	3898
207	Wheelock & Collins A. T. Whittington #1	Rapides	1/2N/1E	1940	785	6397	200 *	5820	-5620	N/R	-	-
208	Hunt Petr. Corp. Langston #1	Rapides	13/2N/2W	1972	121	22471	186	6166	-5980	10410	-10224	4244
209	Midstates Oil Corp. & J. R. Bulter W. S. Terry #1	Rapides	23/2N/4W	1953	1120	9772	208	6170	-5962	N/R	-	-
210	Bateman Drilling Co. C. O. Freeman et al. #1	Rapides	1/1N/1W	1961	1914	9800	121	6950	-6829	N/R	-	-
211	Gulf Oil Corp. Wilson & Johnson #1	Rapides	31/1N/2W	1977	122	14741	188	7410	-7222	11500	-11312	4090
212	The California Co. Long Bell Petr. Co. #1	Rapides	9/1N/3W	1952	222	10299	221	6766	-6545	N/R	-	-
213	Martin Reagan #1 La. Saw Mill Co.	Rapides	21/1N/4W	1959	957	9512	261 D	7090	-6829	N/R	-	-
214	Gulf Refg. Co. Myrtle Pope #1	Rapides	4/1S/2E	1939	1492	6083	66	7890	-7824	N/R	-	-
215	J.A. Hafner, Jr. Well Inc. #1	Rapides	52/1S/2E	1948	43	10514	74	7883	-7809	N/R	-	-
216	Emerald Oil Co. & Equitable Petr. Corp. L. C. Branch #1	Rapides	26/1S/2W	1970	2052	11191	185	8219	-8034	N/R	-	-
217	Tiger Oil Co. Leroy Duplechain #1	Allen	24/5S/3W	1975	3070	14201	89	12000	-11911	N/R	-	-
218	Hunt Energy Corp. John A. Bel et al. #1	Allen	32/5S/4W	1978	3169	13104	85	12090	-12005	N/R	-	-
219	South La. Prod. Co. Bowell Lumber Co. #1	Allen	34/5S/5W	1975	3105	14289	63	12100	-12037	N/R	-	-
220	Tesoro Petr. Corp. & M. T. Halbouty #1 Walker Estate	Allen	30/5S/6W	1973	3814	18596	117	11385	-11268	15500	-15383	4115

NO.	COMPANY / WELL NAME	PARISH	SECTION	YEAR	LOGGED F/	LOGGED TO	KB	TOP WILCOX		BOT WILCOX		THICKNESS
221	Magnolia Petr. Co. Ragley Lbr. Co. #D-1	Allen	29/5S/7W	1951	246	18635	132 D	10822	-10690	14930	-14798	4108
222	The California Co. R. E. Allen #1	Evangline	26/2S/1E	1958	147	10249	43 G	9145	-9102	N/R	-	-
223	G. Ray Cox #1 Natalie Haas Hirsch	Evangline	29/3S/3E	1967	1208	11124	50	10200	-10150	N/R	-	-
224	Continental Oil Co. Orise Deville #8	Evangline	46/3S/2E	1964	1681	11890	97	9585	-9488	N/R	-	-
225	Continental Oil Co. Fonenot-Ludeau-Tate Unit #11 Well #2	Evangline	45/3S/2E	1964	1632	11600	107	9600	-9493	N/R	-	-
226	Mobil Oil Co. Hattie Haas #1	Evangline	3/3S/1E	1967	1828	11524	132	9577	-9445	N/R	-	-
227	Exxon Co. U.S.A. #1 Marion A. Fontenot	Evangline	60/4S/3E	1980	4017	16989	91	11250	-11159	15620	-15529	4370
228	Coronado Minerals Co. H. J. Vidrine Plantation #1	Evangline	14/4S/2E	1978	2987	18290	94	10475	-10381	14185	-14091	3710
229	Inexco Oil Co. D. B. Monceaux #1	Evangline	2/4S/1W	1974	2489	12570	90 *	9870	-9780	N/R	-	-
230	Inexco Oil Co. #1 E. Landreneaux	Evangline	18/4S/1W	1972	1988	13406	80	10240	-10160	N/R	-	-
231	Mccormick Oil & Gas Corp. A. P. Young #1	Evangline	14/5S/2E	1971	2032	13652	90	12040	-11950	N/R	-	-
232	Dac Oil Corp. A. J. Manuel #1	Evangline	9/5S/2E	1980	2933	13375	90 *	11590	-11500	N/R	-	-
233	Woods Petr. Corp. Eddie Perron #1	Evangline	59/5S/2E	1978	4159	14101	91	12070	-11979	N/R	-	-
234	Amer. Quasar Petr. Co. & Southport Expl. I A. Lavergne Jr. #1	Evangline	43/5S/1E	1975	3490	18504	76	11887	-11811	15560	-15484	3673
235	B. M. Hestler Reed #1	Evangline	36/5S/1W	1980	2267	12278	72	12130	-12058	N/R	-	-
236	Mosbacher Prod. Co. Evangline Parish School Board #1	Evangline	16/5S/1W	1982	3678	14116	87	11645	-11558	N/R	-	-
237	S. W. Richardson Stanolind Elsie Vidrine #1	Evangline	12/5S/2W	1948	405	13407	69 D	11760	-11691	N/R	-	-
238	Sabine Prod. Co. Marion M. Goudeau#1	St. Landry	26/2S/4E	1978	293	17467	68	9100	-9032	13000	-12932	3900
239	Shell Oil Co. Oscar Sylvester #1	St. Landry	38/2S/3E	1979	249	18994	73	9200	-9127	13650	-13577	4450
240	Chevron U.S.A., Inc. J. B. Lowrey #1	St. Landry	9/3S/7E	1980	3320	17894	68	9670	-9602	14435	-14367	4765
241	Chevron U.S.A., Inc. Delano Plantation #3	St. Landry	7/3S/7E	1979	178	18149	60	9577	-9517	13220	-13160	3643
242	Chevron U.S.A., Inc. Delano Plantation #1	St. Landry	8/3S/7E	1979	218	15444	62	9700	-9638	13805	-13743	4105

NO.	COMPANY / WELL NAME	PARISH	SECTION	YEAR	LOGGED F/	LOGGED TO	KB	TOP WILCOX		BOT WILCOX		THICKNESS
243	Shell Oil Co. C. A. G. Jarrell #1	St. Landry	13/3S/7E	1979	252	20902	57	9740	-9683	14005	-13948	4265
244	Shell Oil Co. Martin Lumber Co. #1	St. Landry	25/3S/6E	1979	3112	15816	56	9730	-9674	13350	-13294	3620
245	Shell Oil Co. Martin Lumber Co. "A" #2	St. Landry	36/3S/6E	1981	3174	14454	61	9830	-9769	13340	-13279	3510
246	Crosby Drlg. Corp. Lyle Cummins E. Gordon #1	St. Landry	2/3S/6E	1945	50	11733	61	9209	-9148	N/R	-	-
247	Gulf Oil Corp. India Thistlethawaite #2	St. Landry	3/3S/6E	1978	156	17504	58	9040	-8982	12665	-12607	3625
248	Shell Oil Co. Turner #3	St. Landry	21/3S/6E	1980	249	19987	58	9560	-9502	13010	-12952	3450
249	Gulf Oil Corp. Turner Lumber Co. #2	St. Landry	5/3S/6E	1977	4006	17383	62	9057	-8995	12920	-12858	3863
250	Shell Oil Co. W. Myers #1	St. Landry	17/3S/6E	1987	3143	19654	58	9520	-9462	13800	-13742	4280
251	Martin Expl. Co. & Sohio Petr. Co. RO. O. Martin Lumber Co., Inc.	St. Landry	32/3S/6E	1981	3948	20450	72	9962	-9890	13838	-13766	3876
252	Gulf Oil Co. Turner Lumber Co. #4	St. Landry	6/3S/6E	1978	4584	17257	61	9100	-9039	12480	-12419	3380
253	Chevron U.S.A., Inc. #1 Turner Lmbr. Co.	St. Landry	14/3S/5E	1981	119	3954	32	9530	-9498	13170	-13138	3640
254	Martin Expl. Co. Delahousaye #1	St. Landry	17/3S/4E	1980	3502	20973	69	9510	-9441	13600	-13531	4090
255	Billups Bros. Oil Co. H. Flowers Foundation #1	St. Landry	23/4S/7E	1964	2514	11374	37	10850	-10813	N/R	-	-
256	Billups Bros. Oil Co., Inc. Second Lake Pleasure Club Well #1	St. Landry	23/4S/7E	1964	2557	11512	37	10857	-10820	N/R	-	-
257	Anadarko Prod. Co. Kirby Petr. Corp. "A" Well #1	St. Landry	36/4S/6E	1966	2528	12495	50 *	10900	-10850	N/R	-	-
258	Getty Oil Co. Brewer-Nienstedt 28-6 #1	St. Landry	28/4S/6E	1977	3464	14816	62	11140	-11078	N/R	-	-
259	Getty Oil Co. Brewer-Neinstadt Lmbr. Co. #1	St. Landry	29/4S/6E	1981	160	17986	62	11210	-11148	N/R	-	-
260	Inexco Oil Co. Thistlewaite #1	St. Landry	18/4S/5E	1976	2566	15486	60	10650	-10590	N/R	-	-
261	Martin Expl. Co. & Sohio Petr. Co. Echart #1	St. Landry	40/4S/4E	1980	4026	25703	74	10620	-10546	14660	-14586	4040
262	E. A. Courtney Michael J. Artall #1	St. Landry	2/5S/7E	1966	1978	11986	43	10810	-10767	N/R	-	-
263	Sun Oil Co. Bolz #1	St. Landry	4/5S/7E	1952	1923	11994	50 *	11280	-11230	N/R	-	-
264	Damson Oil Corp. Martin Lumber Co. #1	St. Landry	4/5S/7E	1975	2556	12492	44	11180	-11136	N/R	-	-

NO.	COMPANY / WELL NAME	PARISH	SECTION	YEAR	LOGGED F/	LOGGED TO	KB	TOP WILCOX		BOT WILCOX		THICKNESS
265	Inexco Oil Co. Martin Lumber Co. #1	St. Landry	5/5S/7E	1977	4014	14183	65	11270	-11205	N/R	-	-
266	Inexco Oil Co. B. F. Morgan #1	St. Landry	2/5S/6E	1980	3551	14618	51 *	11210	-11159	N/R	-	-
267	J. P. Owen -Clinton Oil Co. Elder Realty Co. #1	St. Landry	15/5S/6E	1969	2538	13511	50 *	12360	-12310	N/R	-	-
268	La. Land & Expl. Co. Gilbert Stanford #1	St. Landry	21/5S/5E	1978	4023	17941	53	12600	-12547	17672	-17619	5072
269	Tiger Oil Co. Thistlethwaite Lumber Co. #2	St. Landry	5/5S/5E	1976	1800	16528	47	11475	-11428	16130	-16083	4655
270	La. Land & Expl. Co. Irene D. Gay #1	St. Landry	39/5S/SE	1980	138	17387	50 *	12320	-12270	N/R	-	-
271	Burnet Oil Co. Eah Stelly #1	St. Landry	67/5S/4E	1982	2543	13093	53	12214	-12161	N/R	-	-
272	Humble Oil & Refg. Co. Moise Casimere #1	St. Landry	109/5S/3E	1968	2994	17511	80 *	12045	-11965	16738	-16658	4693
273	The Dow Chemical Co. Opelousas St. Landry Securites #1	St. Landry	31/5S/3E	1980	3005	13504	84	11778	-11694	N/R	-	-
274	Dow Chemical, U.S.A.-Edwin L. Cox et al. Regile Doucet, Jr. #1	St. Landry	52/5S/3E	1977	3018	13788	78	12006	-11928	N/R	-	-
275	Gulf Oil Co. Planters Securities Co. #2	St. Landry	20/6S/7E	1979	3045	14953	52	13440	-13388	N/R	-	-
276	Southern Natural Gas Co. & Trend Expl. N. S. Penik Heirs #1	St. Landry	2/6S/7E	1969	124	13987	40 *	12170	-12130	N/R	-	-
277	Sun Oil Co. Ossco #1	St. Landry	11/6S/7E	1968	3000	14497	40	12305	-12265	N/R	-	-
278	Stanolind Oil & Gas Co. St. Landry Parish School Board #1	St. Landry	16/6S/6E	1953	120	12989	40 *	13090	-13050	N/R	-	-
279	Columbia Gas Dev. Corp. Collins Lanclos #1	St. Landry	39/6S/6E	1978	3036	17007	38	13750	-13712	N/R	-	-
280	American Quasar Petr. Co. Q. Sylvester, Jr. #1	St. Landry	37/6S/6E	1975	3047	14935	41	13830	-13789	N/R	-	-
281	Halbouty-Reserve Bessie L. Stagg #1	St. Landry	28/6S/5E	1970	2504	15270	47	13633	-13586	N/R	-	-
282	Universal resources Corp. Alice B. Rozas #1	St. Landry	59/6S/4E	1972	4468	16023	52	12520	-12468	N/R	-	-
283	Halbouty-Reserve-Peltex J. B. S. Lalonde #1	St. Landry	117/6S/4E	1969	2450	15060	80 D	13605	-13525	N/R	-	-
284	Humble O & R Co. W. R. Buffington #1	Point Coupee	84/1S/7E	1946	97	11099	65 *	7780	-7715	N/R	-	-
285	Roy M. Huffington, Inc. L. G. Levee Lambert et al. #1	Point Coupee	4/2S/8E	1980	3980	15837	64	7935	-7871	11785	-11721	3850
286	Gulf Oil Corp. D.W. Rice #1	Point Coupee	57/2S/7E	1972	3990	21484	64	8760	-8696	12340	-12276	3580

NO.	COMPANY / WELL NAME	PARISH	SECTION	YEAR	LOGGED F/	LOGGED TO	KB	TOP WILCOX		BOT WILCOX		THICKNESS
287	Cabot Corp. Ovide B. Lacour #1	Point Coupee	42/3S/8E	1961	2014	11569	57 D	8777	-8720	N/R	-	-
288	W. A. Moncrief Robert E. Lee #1	Point Coupee	38/3S/8E	1978	3994	16904	102	8800	-8698	12280	-12178	3480
289	Penzoil Prod. Co. Newman J. Laborde #1	Point Coupee	22/3S/7E	1980	160	16931	65	9120	-9055	12980	-12915	3860
290	Loutex Energy, Inc. Loutex B. Watson #1	Point Coupee	31/3S/7E	1981	4068	18639	61	9615	-9554	13420	-13359	3805
291	Tenneco Oil Co. Guranty Bank & Trust of Lafayette #1	Point Coupee	34/3S/7E	1981	4324	17015	57	8976	-8919	12883	-12826	3907
292	Conoco Inc. L. J. Schhhhexnayder #2	Point Coupee	5/4S/10E	1979	1281	18548	58	9778	-9720	13140	-13082	3362
293	Amoco Prod. Co. 13100' Tusc RA SUD; J. T. Butler #1	Point Coupee	54/4S/10E	1979	3174	18704	50	10130	-10080	13540	-13490	3410
294	Amoco Prod. Co. Ravenswood Co. Inc. #1	Point Coupee	41/4S/9E	1980	216	18920	55	9970	-9915	13970	-13915	4000
295	Amoco Prod. Co. J. M. Hess et al. #1	Point Coupee	95/4S/8E	1980	220	18604	61	9860	-9799	13410	-13349	3550
296	Amoco Prod. Co. Porothy C. Brown #1	Point Coupee	82/4S/8E	1979	3538	13518	60 *	10355	-10295	13600	-13540	3245
297	Chevron U. S. A., INc. N. H. # 17-077-20248	Point Coupee	3/4S/7E	1980	4436	20184	68	9715	-9647	12925	-12857	3210
298	MTS Limited Partnership Barton #1	Point Coupee	32/4S/7E	1981	235	20537	63	10390	-10327	13915	-13852	3525
299	Getty Oil Co. Robert Berthier #1	Point Coupee	95/5S/11E	1980	185	19476	60	10225	-10165	12830	-12770	2605
300	Chevron U. S. A., INc. L. J. Harlaux #1	Point Coupee	30/5S/10E	1980	3978	19452	63	10370	-10307	13200	-13137	2830
301	Chevron U. S. A., INc. A. F. Harmon #1	Point Coupee	16/5S/9E	1981	4046	21300	52	10530	-10478	13383	-13331	2853
302	Chevron U. S. A., INc. Boner-Beanks Lumber Co. #1	Point Coupee	9/5S/9E	1980	246	21134	51	10480	-10429	13220	-13169	2740
303	The Texas Co. J. R. Reuter #4	Point Coupee	30/5S/9E	1953	2604	10517	39	N/R	-	N/R	-	-
304	Texaco, Inc. Wilfred R. Kraemer #1	Point Coupee	81/5S/8E	1966	2644	12534	40 *	11310	-11270	N/R	-	-
305	Amoco Prod. Co. Rex Callicott #1	Point Coupee	60/5S/8E	1980	210	21112	51	10480	-10429	13430	-13379	2950
306	Texaco, Inc. A. C. Wolfe #1	Point Coupee	86/5S/8E	1974	2510	13972	45	11340	-11295	N/R	-	-
307	Inexco Oil Co. Louis L. Claiborne et al. #1	Point Coupee	77/5S/8E	1979	3000	13104	26	11103	-11077	N/R	-	-
308	Inexco Oil Co. Harry R. Mcneal et al. #1	Point Coupee	78/5S/8E	1980	3001	13447	43	11352	-11309	N/R	-	-

NO	COMPANY / WELL NAME	PARISH	SECTION	YEAR	LOGGED F/	LOGGED TO	KB	TOP WILCOX		BOT WILCOX		THICKNESS
309	Inexco Oil Co. J. S. Kean, Jr. #3	Point Coupee	40/5S/7E	1979	3005	14706	44	11325	-11281	N/R	-	-
310	Inexco Oil Co. J. S. Kean, Jr. #1	Point Coupee	41/5S/7E	1978	3053	15399	24	11355	-11331	15270	-15246	3915
311	Inexco Oil Co. J. S. Kean, Jr. #2	Point Coupee	22/5S/7E	1979	3040	14858	25	11360	-11335	N/R	-	-
312	Amoco Prod. Co. A. M. Daniel #1	W. Feliciana	43/2S/2W	1981	4023	15675	212	8400	-8188	12042	-11830	3642
313	W. A. Moncrief E. L. Butler #1	W. Feliciana	66/2S/3W	1978	4013	15938	150	8410	-8260	12030	-11880	3620
314	Barnwell Drlg. Co. Bornwell-Feliciana Unit #1	W. Feliciana	46/2S/4W	1981	1754	11454	150 *	7884	-7734	11256	-11106	3372
315	Wagner & Brown M. L. Harvey #1	E. Feliciana	48/2S/3E	1984	4013	14172	201	7290	-7089	10750	-10549	3460
316	United Prod. Co. Inc. Boy Scouts of America #1	E. Feliciana	41/2S/2E	1962	196	15056	214 D	7400	-7186	10870	-10656	3470
317	Sun Oil Co. Refuge Plantation Inc. #1	E. Feliciana	76/2S/1E	1980	4180	14710	297	7520	-7223	11020	-10723	3500
318	Exchange Oil & Gas Corp. Warren T. Price #1	E. Feliciana	63/3S/1E	1979	4260	15526	220	8345	-8125	11900	-11680	3555
319	First Energy Corp. S/L 9254 #2	E. Feliciana	59/2S/1W	1982	3987	13996	207	8080	-7873	11700	-11493	3620
320	Amarex, Inc. Milford Cobb #1	E. Baton Rouge	68/6S/2E	1980	3581	19114	64	10250	-10186	13250	-13186	3000
321	Amoco Prod. Co. 1800 Tusc RB SU1; Jerry D. Long #1	E. Baton Rouge	36/5S/1E	1982	3506	18495	97	10150	-10053	13250	-13153	3100
322	South La. Prod. Co., Inc. Netter #1	E. Baton Rouge	14/5S/1W	1981	3674	18766	121	10210	-10089	13360	-13239	3150
323	The La. Land & Expl. Co. W. J. Decker #1	E. Baton Rouge	71/5S/1W	1980	128	19605	111	10020	-9909	13300	-13189	3280

APPENDIX 4

LIST OF WILCOX OIL AND GAS FIELDS

The following tables were compiled from Shreveport Geological Society (1961), Louisiana Geological Survey (1980), Office of Conservation (1979), and Maison Map Service, Inc. and International Oil Scouts Association (1990). Set A was sorted by field name. Set B was sorted by parish.

Set A: Wilcox Oil and Gas Fields by Field Name

FIELD NAME	PARISH	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
ALLIGATOR LAKE	BEAUREGARD	4S	12W	1958	45	10684	2		29,672				
ALOHA	GRANT	7N	4W	1953	45	4290	7		606,087				
ALSEN	E BATON ROUGE	5S	1W	1957	37	10104	6		969,001				
BABAYS LAKE	CATAHOULA	5N	5E	1979	44		1						
BALLINA	CONCORDIA	8N	8E	1965		4784	5		538,289			TEW LAKE	
BANCROFT	BEAUREGARD	6S	13W	1965	50	10191	65		8,893,396	415,564	9,612,114		CKF
BANCROFT	BEAUREGARD	6S	13W	1964	47	10296							CKF
BANCROFT N	BEAUREGARD	5S	13W	1949	40	9300	21		11,587,275	758	12,465		
BANCROFT S	BEAUREGARD	6S	13W	1948	40	10194	10						
BANCROFT S	BEAUREGARD	6S	13W	1948	36	10239			704,317	251,974	1,809,677		
BANKS SPRINGS	CALDWELL	13N	3E	1971		1828	14	G				ADAS SD	
BANKS SPRINGS	CALDWELL	13N	3E	1971		2510		G			5,796,508		
BANKS SPRINGS N	CALDWELL	13N	3E	1973		2452	1				244,775		
BAYOU CASTOR	LA SALLE	11N	2E	1960		2607	3						
BAYOU COCORDIE	CONCORDIA	7N	4W	1951	47	6944	3		570,696			BEE CREEK	
BAYOU COCORDIE MID	CONCORDIA	4N	8E	1974	47	6708	4		332,798				
BAYOU COCODRIE N	CONCORDIA	5N	8E	1953	47	6478	9		499,332			C-7	
BAYOU COCODRIE S	CONCORDIA	3N	8E	1953	43		1					WILDS	
BAYOU COCODRIE W	CONCORDIA	4N	8E	1951	48	6944	9		593,568			YAKEY	
BAYOU GERANCE	POINT COUPEE	5S	8E	1964	42	11628	4		344,247				
BAYOU JEANSONNE	AVOYELLES	2N	6E	1963	48	7343	1		4,888				
BAYOU LOUIS	CATAHOULA	9N	8E	1966	41	4239	9		1,203,631			TEW LAKE	
BAYOU TOMMY	POINT COUPEE	6S	10E	1970	47	12427	2		510,155				SPA
BAYOU TWISTY	AVOYELLES	3N	5E	1952	43	7402	1		20,535			BAYOU TWISTY	
BEACONS GULLY	EVANGLINE	5S	1E	1963	57	11876	15		2,542,672	1,487,524	17,688,117		
BEAR HEAD CREEK S	BEAUREGARD	6S	11W	1966	47	10889	15		1,940,673	145,154	1,035,017		CKF
BEAUCOUP CREEK	CALDWELL	13N	2E	1974		1949	3	G			1,320,237		
BEE BRAKE	CONCORDIA	4N	6E	1953	38	6776	34		3,239,336			BEE BRAKE	
BEE BRAKE	CONCORDIA	4N	6E	1972	39							"TWISTER	

FIELD NAME	PARISH	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
BEE BRAKE N	CONCORDIA	4N	6E	1964	42	6148	27		3,223,866			C-7	
BEGGS	ST LANDRY	4S	4E	1973	48	11574		G		49,582	703,944		
BEGGS	ST LANDRY	4S	4E	1973	51	11482	1	G					
BIG BAYOU	CATAHOULA	6N	5E	1952	39	5152	12		1,879,354			BIG BAYOU	
BIG ISLAND	RAPIDES	4N	3E	1942	48	4796	106		10,702,364			TEW LAKE	TUSC
BIG ISLAND	RAPIDES	4N	3E	1942								C-5	CR
BIG ISLAND	RAPIDES	4N	3E	1942								CAMPBELL	
BIG ISLAND	RAPIDES	4N	3E	1942								E-5	
BIG ISLAND	RAPIDES	4N	3E	1942								LA. DELTA #8	
BIG ISLAND	RAPIDES	4N	3E	1942								C-7	
BIG ISLAND	RAPIDES	4N	3E	1942								BEE BRAKE	
BIG ISLAND	RAPIDES	4N	3E	1942								LA. DELTA #12	
BIG ISLAND	RAPIDES	4N	3E	1942								SCIVALLY	
BIG ISLAND	RAPIDES	4N	3E	1942								DEVILLE	
BIG ISLAND	RAPIDES	4N	3E	1942								HUDSON	
BIG ISLAND	RAPIDES	4N	3E	1942								BIG BAYOU	
BIG ISLAND N	RAPIDES	5N	3E	1962	44	5053	104		18,273,998			LA. DELTA #8	
BIG ISLAND N	RAPIDES	5N	3E	1963	45	3970						LA. DELTA #12	
BIG ISLAND N	RAPIDES	5N	3E	1965	42	4983							
BIG LARTO BAYOU	CATAHOULA	4N	5E	1972	37	5826	4		134,116				
BISLAND BAYOU	CONCORDIA	8N	10E	1974	46	5813	2		46,595				
BIVENS	BEAUREGARD	5S	12W	1964	35	9432	24						CKF
BLACK HAWK	CONCORDIA	2N	8E	1954	46	8009	11		1,683,056			C-7	
BLACK HAWK	CONCORDIA	2N	8E	1954								BEE BRAKE	
BLISS	RAPIDES	1N	3W	1952	45	9394	4		215,628				
BOGGY BAYOU	CONCORDIA	7N	7E	1964	41	5141	9		2,222,704				
BOGGY BAYOU	CONCORDIA	7N	7E	1965		5475						STRAY	
BOLTNER'S BRAKE	CATAHOULA	6N	5E	1960	41	4915	3		411,190			SCIVALLY	
BORDELONVILLE	AVOYELLES	2N	5E	1951	49	8411	1		9,808			BEE BRAKE	

FIELD NAME	PARISH	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
BOUGERE	CONCORDIA	4N	9E	1955	49	6613	27		1,568,294			MILLER	
BOUGERE	CONCORDIA	4N	9E	1964	49	7131							
BOUGERE	CONCORDIA	4N	9E	1964	41	5632							
BOUGERE N	CONCORDIA	4N	9E	1965		5480	10						
BOUGERE N	CONCORDIA	4N	9E	1965		6726			1,387,356				
BRABSTON	CONCORDIA	4N	8E	1955	46	6311	10		1,153,295			TEW LAKE	
BRABSTON	CONCORDIA	4N	8E	1955								MILLER	
BURLINGTON	CALDWELL	11N	3E	1969		2800	2	G			511,760		
BURLINGTON	CALDWELL	11N	3E	1972		2791							
BURLINGTON	CALDWELL	11N	3E	1972		2830							
CALIFORNIA BAYOU	CATAHOULA	7N	6E	1960	39	3851	10		1,427,876			STEWART "B"	
CALIFORNIA BAYOU	CATAHOULA	7N	6E	1965		4628						A-1	
CARR LAKE	CATAHOULA	7N	6E	1958	42	5187	5		230,556			E-5	
CATAHOULA LAKE	LA SALLE	6N	4E	1942	36	3814	65		21,014,932			C-5	
CATAHOULA LAKE	LA SALLE	6N	4E	1942								LONG SLOUGH	
CATAHOULA LAKE	LA SALLE	6N	4E	1942								E-5	
CATAHOULA LAKE	LA SALLE	6N	4E	1942								C-7	
CATAHOULA LAKE	LA SALLE	6N	4E	1942								LA. DELTA #12	
CATAHOULA LAKE	LA SALLE	6N	4E	1942								LA. DELTA #81	
CATAHOULA LAKE	LA SALLE	6N	4E	1964	48	4503							
CATAHOULA LAKE N	LA SALLE	7N	4E	1951	36	4112	1					LONG SLOUGH	
CATAHOULA LAKE S	RAPIDES	6N	3E	1958	42	4095	28		828,166			TURNER	
CATAHOULA LAKE W	LA SALLE	6N	3E	1949	40	2600	68					C-7	
CATAHOULA LAKE W	LA SALLE	6N	3E	1949		3400						BEE BRAKE	
CATAHOULA LAKE W	LA SALLE	6N	3E	1949		4000			15,791,365				
CATFISH BAYOU	CONCORDIA	3N	7E	1963	42	6378	6		294,327			MILLER	
CATFISH BAYOU W	CONCORDIA	3N	7E	1967	40	7326	2		69,711			MINTER	
CHANEY LAKES	CONCORDIA	3N	7E	1949	52	6918	2		53,444			MILLER	
CHANEY LAKES	CONCORDIA	3N	7E	1965		7698						STRAY	

FIELD NAME	PARISH	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
CHICKASAW CREEK	LA SALLE	11N	3E	1968		2214	2	G			201,224		
CLARKS	CALDWELL	12N	3E	1941		2173	3	G			2,058,386		
CLARKS	CALDWELL	12N	3E	1967		2730		G					
CLARKS N	CALDWELL	12N	3E	1972		1692	4	G			1,733,884		
CLARKS S	CALDWELL	12N	3E	1972		2380	3	G			1,326,231		
CLARKS W	CALDWELL	12N	3E	1974		2582	10	G			3,226,484		
CLAYTON	CONCORDIA	8N	10E	1954	44	5146	53		4,948,414			MILLER	
CLAYTON	CONCORDIA	8N	10E	1965		4927						TURNER	
CLAYTON	CONCORDIA	8N	10E	1965								ARTMAN	
CLARKS	CALDWELL	12N	3E	1965									
COCODRIE LAKE	CONCORDIA	6N	7E	1965		5400	9		853,603			MILLER	
COLFAX	GRANT	7N	4W	1979			3		155,327				
COLGRADE	WINN	11N	1W	1959	21	1278	605		16,345,996		290,195	FIRST WILCOX	SPA
COLUMBIA	CALDWELL	13N	4E	1968		2140	23	G	5,535		12,910,902		
COLUMBIA	CALDWELL	13N	4E	1968		2472		G					
COLUMBIA E	CALDWELL	13N	4E	1974		2685	2	G			137,539		
COLUMBIA S	CALDWELL	13N	4E	1972		2532	5	G			2,368,191		
COLUMBIA W	CALDWELL	13N	3E	1975		1736	3	G			465,158		
COOPER	CALDWELL	13N	3E	1974		2494	1	G			184,580		
COTTON PLANT	CALDWELL	13N	2E	1975		2266	35	G			43,451,438		
CROSS BAYOU	CATAHOULA	5N	5E	1970		5296	3		296,448				
CROSS COCODRIE	CONCORDIA	6N	8E	1957	45	5511	1		1,701			MILLER	
CROSS ROADS	WINN	10N	1E	1954	20	1482	210		2,039,841		342,151	FIRST WILCOX	
CROSS ROADS S	WINN	10N	1E	1967	21	1461	4		15,500				
CURRY	WINN	10N	1E	1957	20	1416	41		233,278			FIRST WILCOX	
CURRY	WINN	10N	1E	1961	21	1371							
CYPRESS BAYOU	LA SALLE	6N	4E	1941	44	4303	38		1,018,204			C-5	
CYPRESS BAYOU	LA SALLE	6N	4E	1969		4291						SCIVALLY	
DAVID HAAS	AVOYELLES	2S	2E	1956		8470	29					FIRST WILCOX	

FIELD NAME	PARISH	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
DAVID HAAS	AVOYELLES	2S	2E	1947	56	8562			13,206,727		371	SECOND WILCOX	
DEER PARK	CONCORDIA	5N	9E	1950	45	4711	10		375,207			QUINN BAYOU	
DEER PARK	CONCORDIA	5N	9E	1950								TEW LAKE	
DEER PARK	CONCORDIA	5N	9E	1950								ARTMAN	
DOBBS BAY	CONCORDIA	3N	8E	1979	47	7214	3						
DODSON	WINN	12N	3W	1971		1972	1		0				
ELM RIDGE	LA SALLE	6N	4E	1942	41	4752	3		32,286			CAMPBELL	
ELM RIDGE W	LA SALLE	6N	4E	1953	42	4737	1		102,925			SCIVALLY	
EOLA	AVOYELLES	2S	3E	1939		8446	126		33,594,541	116,324	3,946,671	FIRST WILCOX	CKF
EPPS	WEST CARROLL	19N	10E	1928		1470	40	G			56,004,060	FIRST WILCOX	MGR
ESPERANCE POINT	CONCORDIA	5N	9E	1950	45	6327	100		21,781,156			CAMPBELL	
ESPERANCE POINT	CONCORDIA	5N	9E	1950	44	4798						QUINN BAYOU	
ESPERANCE POINT	CONCORDIA	5N	9E	1950								SECOND WILCOX	
ESPERANCE POINT	CONCORDIA	5N	9E	1950								ARTMAN	
ESPERANCE POINT	CONCORDIA	5N	9E	1950								C-7	
ESPERANCE POINT	CONCORDIA	5N	9E	1950								CAMPBELL	
ESPERANCE POINT	CONCORDIA	5N	9E	1965								TEW LAKE	
FAIRCHILD BEND	CONCORDIA	8N	10E	1979	45	5529	2		250,674				
FAIRVIEW	CONCORDIA	4N	9E	1950	46	6680	28		11,272,644			CAMPBELL	
FAIRVIEW	CONCORDIA	4N	9E	1950								ARMSTRONG	
FAIRVIEW	CONCORDIA	4N	9E	1950								BAKER	
FAIRVIEW	CONCORDIA	4N	9E	1950								PARKER	
FAIRVIEW	CONCORDIA	4N	9E	1950								E-5	
FAIRVIEW	CONCORDIA	4N	9E	1950								BEE BRAKE	
FENRIS E	EVANGLINE	5S	1W	1974	46	13528	1			88,977	842,676		
FIELDS	BEAUREGARD	6S	12W	1965	51	10460	27		1,523,142	5,229,223	30017566		CKF
FIELDS	BEAUREGARD	6S	12W	1966		11022		G					CKF
FIVE MILE BAYOU	AVOYELLES	3N	7E	1963	45	6969	27		3,095,351				
FIVE MILE BAYOU	AVOYELLES	3N	7E	1965	36	7399							

FIELD NAME	PARISH	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
FLAT CREEK	WINN	12N	1E	1970		1764	2	G			486,900		
FLAT CREEK	WINN	12N	1E	1970		1934							
FLATWOODS	RAPIDES	5N	5W	1945	48	6488	1		1,112				
FLOAT BAYOU	CONCORDIA	7N	8E	1965		5577	11		1,719,770				
FORDOCHE	POINT COUPEE	6S	8E	1966	49	13784	132		45,657,097	2,714,429	174,724,714		
FORDOCHE	POINT COUPEE	6S	8E	1966	49	13983							
FORT JESUP	SABINE	7N	10E	1962	24	2188	209						SAR
FRENCH FORK	LA SALLE	6N	4E	1955	43	4458	10		970,128			C-7	
FRENCH FORK S	LA SALLE	6N	4E	1969	48	4343	5		694,992			CAMP	
FRENCH FORK S	LA SALLE	6N	4E	1969	46							SALINE LAKE	
FRISCO	POINT COUPEE	6S	9E	1964	44	11585	39		4,068,906				SPA
FROGMORE	CONCORDIA	8N	8E	1958	38	4950	21		2,651,307			MILLER	
GALBRAITH	NATCHITOCHES	6N	4W	1970	50	5112	3		182,994				
GILES BEND	CONCORDIA	8N	10E	1971	47	5506	15		3,438,691				
GLADE	CATAHOULA	6N	6E	1968	38	5505	4		161,501				
GLENMORA	RAPIDES	1S	2W	1950	57	10452	16		2,955,432	58,570	649,527		EOC(GAS)
GLENMORA	RAPIDES	1S	2W	1950									
GLENMORA	RAPIDES	1S	2W	1950									
GLENMORA	RAPIDES	1S	2W	1950									
GORDON W	BEAUREGARD	7S	9W	1967	53	13226	4		570,703	580	5,800		
GORUM	NATCHITOCHES	5N	6W	1948	49	5788							
GRAYSON	CALDWELL	12N	3E	1969		2219	1	G			166,712		
GRAYSON N	CALDWELL	13N	3E	1972		2494	3	G			372,078		
HARRISONBURG	CATAHOULA	9N	7E	1955	43	4185	28		3,946,663			TEW LAKE	
HARRISONBURG	CATAHOULA	9N	7E	1955								MILLER	
HICKARY VALLEY	WINN	12N	1E	1969		2166	5	G			48,938		
HICKARY VALLEY NE	WINN	12N	1E	1976		2140	5	G			2,112,795		
HICKARY VALLEY N	WINN	12N	1E	1974		2338	5	G			1,373,416		
HICKARY VALLEY N	WINN	13N	1E	1976		2138		G					

FIELD NAME	PARISH	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
HICKARY VALLEY W	WINN	12N	1W	1974		2471	1	G			38,032		
HINESTON	RAPIDES	2N	4W	1953	44	8591	1		7,854				
HONEY BRAKE LAKE	CATAHOULA	5N	6E	1971	43	5031	5		625,907				
HOLLY RIDGE	TENSAS	11N	9E	1948	38	3000	96		16,200,829	100,708	49,062,581	FIRST WILCOX	TUSC, PXY(GA
HOLLY RIDGE N	TENSAS	11N	10E	1944	29	3008	1						
HORSESHOE	CONCORDIA	6N	7E	1953	39	5310	12		1,953,532			TEW LAKE	
HORSESHOE N	CONCORDIA	7N	7E	1959	36	5245	3		93,891			TEW LAKE	
HUDSON BRAKE	CATAHOULA	6N	5E	1970	46	5176	1		77,060				
HUMBLE LAKE	CALDWELL	14N	4E	1976		2635	2			228,888			
HURRICANE CREEK	BEAUREGARD	5S	8W	1943		14528	44		11,480,311	1,671	775,639		CKF
INDIAN BAYOU	LA SALLE	6N	3E	1942	42	4294	8		958,768			INDIAN BAYOU	
JENA S	CATAHOULA	8N	3E	1941	35		19		708,943	1,833	506,358		
JENA S	LA SALLE	8N	3E	1941	35	3272			1,435,465	1,981	582,056		
JONESVILLE	CATAHOULA	8N	7E	1966	38	4816	4					MILLER	
JOYCE	WINN	12N	2W	1949	21	1112	121		1,632,165			FIRST WILCOX	
KINCAID BAYOU	TEW LAKE	6N	7E	1961	48	5463	19		1,615,275			TEW LAKE	
KINCAID BAYOU	TEW LAKE	6N	7E	1961	44	5957						E-5	
KINCAID BAYOU	TEW LAKE	6N	7E	1962	44	5271						E-2	
KINCAID BAYOU E	CATAHOULA	6N	7E	1968	38	6090	2		26,069				
KOLIN	RAPIDES	3N	2E	1958	48	6442	1		2,102			A-1	
LAKE CURRY	CONCORDIA	4N	6E	1961	48	6608	40		6,162,511				
LAKE OPHELIA	AVOYELLES	3N	6E	1963	40	4190	1		346,276				
LAKE OPHELIA E	AVOYELLES	3N	6E	1963	45	6903	2		1,653				
LAKE ROSEAU	AVOYELLES	1N	6E	1963	45	8954	1		419			"GOULD	
LAKE ST JOHN	CONCORDIA	9N	10E	1942		4500	321					FIRST WILCOX	SPA
LAKE ST JOHN	CONCORDIA	9N	10E	1942								SECOND WILCOX	
LAKE ST JOHN	CONCORDIA	9N	10E	1942								"3900-FT."	
LAKE ST JOHN	CONCORDIA	9N	10E	1942								A-1	
LARTO	CATAHOULA	4N	5E	1964	38	6188	1		56,075				

FIELD NAME	PARISH	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
LARTO LAKE	CATAHOULA	5N	5E	1941	39	5110	49		4,073,394			E-2	
LARTO LAKE	CATAHOULA	5N	5E	1941								C-7	
LARTO LAKE E	CATAHOULA	5N	6E	1949		5855			1,523,556			BELTZHOOVER	
LARTO LAKE E	CATAHOULA	5N	6E	1949								BEE BRAKE	
LARTO LAKE S	CATAHOULA	4N	5E	1949	38	5834			2,746,447			MILLER	
LARTO LAKE S	CATAHOULA	5N	6E	1949								ARTMAN	
LISMORE LANDING	CONCORDIA	6N	7E	1951	44	5294			3,683,556			E-2	
LISMORE LANDING	CONCORDIA	6N	7E	1951								TEW LAKE	
LISMORE LANDING	CONCORDIA	6N	7E	1951								E-5	
LITTLE BAYOU	LA SALLE	8N	1E	1954	36	3486			0				
LITTLE CREEK	LA SALLE	9N	2E	1941		2400	289		17,381,843	49,397	6,621,071		
LIVONIA	POINT COUPEE	6S	9E	1965	49	12802	68		8,266,587				
LONG BRANCH	CATAHOULA	5N	5E	1959	41	4935	12		1,120,475			BEE BRAKE	
LONG LAKE	CALDWELL	13N	4E	1974		2488	1	G			324,073		
LONG SLOUGH	LA SALLE	5N	4E	1957	45	3989	13		1,878,092			LONG SLOUGH	
LONG SLOUGH	LA SALLE	5N	4E	1957								C-7	
LORRON LAKE	CATAHOULA	4N	6E	1979	38	6813	1		6,009				
LOST CREEK	CALDWELL	14N	3E	1975		2036	1	G			234,166		
LOWER SUNK LAKE	CONCORDIA	2N	8E	1960	43	5923	22		2,045,101			SECOND WILCOX	
MADKIN BAYOU	CONCORDIA	6N	8E	1964	45	5866	1		196,824			SALINE LAKE	
MAMOU	EVANGLINE	5S	1E	1945	48	11520	26		4,487,823				
MARKSVILLE	AVOYELLES	2N	4E	1948	50	7926	15		2,123,550			LA. DELTA #81	
MEAN LAKE	CATAHOULA	9N	7E	1957	42	4371	38		5,799,522			TEW LAKE	
MEAN LAKE	CATAHOULA	9N	7E	1957								A-1	
MELVILLE	ST LANDRY	4S	7E	1948	54	11240	10		569,418	120,467	1,250,352		SPA
MERRYVILLE	BEAUREGARD	3S	12W	1955	38	7961	9		1,843,318	11,260	80,579		
MERRYVILLE	BEAUREGARD	3S	12W	1961	53	10488		G					
MERRYVILLE	BEAUREGARD	3S	12W	1959	57	10689							
MIDDLE BAYOU	AVOYELLES	4N	4E	1962	50	6230	7		1,025,529				

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MILESTONE FORKS	CONCORDIA	8N	10E	1954	45	5130	17		2,481,172			TURNER (MF)	
MILESTONE FORKS	CONCORDIA	8N	10E	1954		5299						LANCASTER	
MILESTONE FORKS	CONCORDIA	8N	10E	1954								TURNER	
MILESTONE FORKS	CONCORDIA	8N	10E	1954								ARTMAN	
MILLIGAN BAYOU	AVOYELLES	2N	7E	1962	45	7400	13		1,225,697				
MITTEN LAKES	CATAHOULA	4N	5E	1951		5900	2					MILLER	
MITTEN LAKES SW	CATAHOULA	4N	5E	1952		6500	2					BEE BRAKE	
MITTEN LAKES SW	CATAHOULA	4N	5E	1952								LA. DELTA #81	
MONROE	OUCHITA	2N	4E	1963		1324							
MONTEREY	CONCORDIA	6N	7E	1959	47	5644	1		34,656			TURNER	
MONTEREY S	CONCORDIA	5N	7E	1959	43	5801	21		1,500,160			MILLER	
MONTGOMERY	GRANT	8N	5W	1952		3447	1				3,019		
MORO	CONCORDIA	7N	7E	1960	27	3737	1		771			STEWART "A"	
MORRISONVILLE	W BATON ROUG	8S	12E	1968	37	9461	1		70,444				
MOUNT PLEASANT	CALDWELL	13N	3E	1971		2156	4				1,468,185		
MUDDY BAYOU	LA SALLE	5N	4E	1952	45	5195	1		114,073			C-7	
MUDDY BAYOU E	LA SALLE	6N	4E	1970		4254	3						
MUDDY BAYOU E	LA SALLE	6N	4E	1971	48	4076			114,073				
NATCHEZ ISLAND	CONCORDIA	7N	10E	1958	45	6791	11		1,074,087			CAMPBELL	
NATCHEZ ISLAND	CONCORDIA	7N	10E	1965		5801						FOSTER	
NATCHITOCHES BAYOU	AVOYELLES	2N	7E	1963	41	7788	3		108,427				
NEALE	BEAUREGARD	3S	11W	1940	46	11600	78		21,668,080	38,232	895,366		?
NEBO-HEMPHILLE	LA SALLE	7N	3E	1940	37	3340	311		84,428,977	6,097	5,257,172		CKF
NEBO-HEMPHILLE	LA SALLE	7N	3E	1940									SPA
NEGREET	SABINE	6N	12W	1946		1398							
NEW PORT	WINN	13N	1E	1977		1793		G			2,051,914		
OBERLIN	ALLEN	6S	4W	1946	47	12650	14		57	1,515,434	46,235,869		CKF
OBERLIN SE	ALLEN	5S	3W	1952	49	11976	2		24,115	1,665	30,427		
OLLA	LA SALLE	10N	2E	1940	30	2040	443						

FIELD NAME	PARISH	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
OLLA	LA SALLE	10N	2E	1940		3349			82,677,601	6,971	92,824,027		
OLLA S	LA SALLE	10N	2E	1941		2500	14		1,378,000				
OLLA W	LA SALLE	10N	2E	1957	30	2788	1		100				
OMEGA	CONCORDIA	7N	7E	1958	43	4911	17		1,513,381			E-2	
OMEGA E	CONCORDIA	7N	7E	1958								TURNER	
OMEGA E	CONCORDIA	7N	7E	1958								ARTMAN	
ORETTA W	BEAUREGARD	6S	11W	1966	45	10832	3		12,517	64,306	2,601,946		CKF
PARKER LAKE	CATAHOULA	5N	7E	1966	30	4530	30						
PARKER LAKE	CATAHOULA	5N	7E	1965		6396			3,843,600				
PATTON CHURCH	CATAHOULA	8N	6E	1956	44	4471	44		9,056,694			TEW LAKE	
PENDLETON MANY	SABINE	6N	12W	1964	30	1502	830		21,005,784		65,353		SAR
PINE GROVE	BEAUREGARD	5S	12W	1945	46	11350	1		2,050				
PINE PRAIRE	EVANGLINE	3S	1W	1941		10158	136						L MIO, CKF
PINE PRAIRE	EVANGLINE	3S	1W	1974	38	11468							SPA
PISTOL THICKET	CALDWELL	12N	3E	1979		2650	9	G			4,603,149		
PLOUDEN BAYOU	CONCORDIA	6N	8E	1975		6024	5		353,153				
POINT BASSE	AVOYELLES	3N	6E	1969		7638	1		10,880				
POINT BLUE	EVANGLINE	5S	1E	1957	51	11632	1		1,603	93,723	1,436,009		
POOL LAKE	CATAHOULA	8N	7E	1961	42	4567	33					LANCASTER	
POOL LAKE	CATAHOULA	8N	7E	1950	38	4638			2,374,096			TEW LAKE	
POOL LAKE W	CATAHOULA	8N	7E	1952	38	4535	1		46,147			TEW LAKE	
PRAIRIE BAYOU	AVOYELLES	4N	3E	1963	43	6110			12,630				
PRICHARD S	CATAHOULA	10N	6E	1959	39	4125	6		624,425				
QUINN BAYOU	CONCORDIA	5N	8E	1955	40	4817	2		212,494			QUINN BAYOU	
RABBIT BRANCH	LA SALLE	11N	3E	1973		2886	3					RUSS	
RAWSON CREEK	CATAHOULA	10N	6E	1969	41	3906	14		1,654,668				
RED RIVER BAY	CONCORDIA	2N	8E	1963	47	7765	37		5,102,642	13,174	128,838		
REDDELL	EVANGLINE	4S	1W	1957	47	10470	53						SPA
RICHLAND CREEK	WINN	11N	1E	1980		2545		G			1,309,618		

FIELD NAME	PARISH	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
RIFLE POINT	CONCORDIA	5N	10E	1952	39	4016	3		150,418			QUINN BAYOU	
RIFLE POINT S	CONCORDIA	8N	10E	1963	46	5421	10		1,363,162				
ROGERS	LA SALLE	6N	3E	1951	42	3984	41		4,133,245			A-1	
ROGERS	LA SALLE	6N	3E	1951								UNKY	
ROGERS	LA SALLE	6N	3E	1951								E-2	
ROGERS	LA SALLE	6N	3E	1951								TEW LAKE	
ROGERS	LA SALLE	6N	3E	1951								MILLER	
ROGERS	LA SALLE	6N	3E	1951								BEE BRAKE	
ROGERS	LA SALLE	6N	3E	1951								LA DELTA #12	
ROSELAND	CONCORDIA	4N	9E	1953		6606	69		9,546,643			LANCASTER	
ROSELAND	CONCORDIA	4N	9E	1953	46	6749						ARTMAN	
ROSELAND	CONCORDIA	4N	9E	1953								CAMPBELL	
ROSELAND	CONCORDIA	4N	9E	1953								PARKER	
ROSELAND	CONCORDIA	4N	9E	1953								E-5	
ROSS BAYOU	CONCORDIA	6N	7E	1952	43	5088	40		7,506,637			E-2	
ROSS BAYOU	CONCORDIA	6N	7E	1952								E-5	
SALINE LAKE	CATAHOULA	4N	5E	1948	46	5506			11,311,361			E-5	
SALINE LAKE	CATAHOULA	4N	5E	1948								LA DELTA #8	
SALINE LAKE	CATAHOULA	4N	5E	1948								BIG BAYOU	
SALINE LAKE N	LA SALLE	5N	4E	1950	43	4990	8		1,295,184			TEW LAKE	
SALINE LAKE N	LA SALLE	5N	4E	1950								LA. DELTA #8	
SALINE LAKE N	LA SALLE	5N	4E	1950								C-7	
SALINE LAKE W	LA SALLE	5N	4E	1959		5310	3		741,480			LONG SLOUGH	
SALINE LAKE W	LA SALLE	5N	4E	1959								C-7	
SALINE LAKE W	LA SALLE	5N	4E	1959								SCIVALLY	
SALT	WINN	10N	1E	1960	21	1409	52		1,282,814			FIRST WILCOX	
SANDY CREEK	WINN	11N	1E	1977		2643		G			3,127,976		
SANDY BAYOU	LA SALLE	5N	3E	1956	43	4635	19		1,863,423			PARKER	
SANDY BAYOU	LA SALLE	5N	3E	1956								CAMPBELL	

FIELD NAME	PARISH	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
SANDY LAKE	CATAHOULA	8N	6E	1964	33	4298	26		222,515				SPA
SARDIS CHURCH	CALDWELL	12N	2E	1963		2210	15	G			9,552,487		
SEARCY	LA SALLE	8N	2E	1960	36	2690	19		1,480,625		2,461		
SEARCY W	LA SALLE	8N	2E	1961	22	1906	24		1,446,516				
SELMA	GRANT	9N	1E	1957		1821	32		1,094,691			FIRST WILCOX	
SERENA	CATAHOULA	5N	6E	1967	42	5230	3		110,271			E-2	
SHOE BAYOU	CATAHOULA	4N	5E	1969	43	5998	2		34,878				
SHOE BAYOU	CATAHOULA	4N	5E	1972	43	6143						HUDSON	
SIKES E	WINN	12N	1W	1967		1842	8	G			3,854,362		
SIKES E	WINN	12N	1W	1967		2104							
STANDARD	LA SALLE	11N	3E	1940		2164	27	G			15,539,221		
STANDARD N	LA SALLE	11N	3E	1967		2662	8	G			9,358,367		
SUMMERVILLE	LA SALLE	9N	2E	1940	29	2443	34		3,531,076		79,352		
SWIM LAKE	LA SALLE	11N	3E	1967		1898	10	G			5,764,195		
SWIM LAKE E	LA SALLE	11N	3E	1972		2882	1	G			19,422		
TEW LAKE	CATAHOULA	8N	6E	1956	42	4272	63		9,589,965			E-2	
TEW LAKE	CATAHOULA	8N	6E	1956								TEW LAKE	
THREE MILE BAYOU	AVOYELLES	3N	7E	1963	40	7328	2		4,661				
TROUT CREEK	LA SALLE	8N	3E	1941	33	3125	96		3,022,987	285	110,892		
TROUT CREEK	LA SALLE	8N	3E	1951									
TROUT CREEK W	LA SALLE	8N	2E	1959	21	2173	3		8,000				
TULLA E	BEAUREGARD	4S	8W	1953	52	12668	2		114,189				
TULLOS-URANIA	LA SALLE	10N	2E	1950	21	1550	1909		56,499,513		2,161,887	FIRST WILCOX	
VICK	AVOYELLES	3N	4E	1966		6721	44		103,469				
VIDALIA	CONCORDIA	7N	10E	1949	45	5665	13		1,718,809			TURNER	
VIDALIA	CONCORDIA	7N	10E	1949								ARTMAN	
VIDALIA	CONCORDIA	7N	10E	1949								NICHOLS	
VIDALIA S	CONCORDIA	7N	10E	1968	46	5653	7		3,077,460				
VILLE PLATTE	EVANGLINE	3S	2E	1937		9900	304		61,556,047	3,933,138	187,012,764		SPA

FIELD NAME	PARISH	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
VILLE PLATTE	EVANGLINE	3S	2E	1937		10090							
VILLE PLATTE	EVANGLINE	3S	2E	1937		10227							
WALLACE LAKE	CATAHOULA	8N	6E	1960								TEW LAKE	
WASHINGTON S	ST LANDRY	5S	5E	1958	65	10035	5	G	73,034	199,347	3,234,205		CKF
WAVERLY POINT	CONCORDIA	7N	10E	1954	44	5546	7		411,802			TURNER	
WAVERLY POINT	CONCORDIA	7N	10E	1954								ARTMAN	
WHITE'S BAYOU	CONCORDIA	5N	8E	1960	38	4700	1		8,106			QUINN BAYOU	
WHITE'S BAYOU N	CONCORDIA	6N	8E	1972	45	6195	4		513,116				
WILD COW BAYOU	CONCORDIA	5N	7E	1964	49	6179	1		17,103				
WILDSVILLEE	CONCORDIA	7N	7E	1951	40	4830	19		1,015,778			E-2	
WILDSVILLEE	CONCORDIA	7N	7E	1964	38	4920						WILDS, C-5	
WILLOW LAKE	CATAHOULA	6N	6E	1961	45	4991	12					E-2	
WILLOW LAKE	CATAHOULA	6N	6E	1967	50	5059						E-5	
WILLOW LAKE	CATAHOULA	6N	6E	1941	37	5530			1,315,528				
WILLOW LAKE N	CATAHOULA	6N	6E	1964	40	4947	3		198,797				SPA
WOLF PRAIRIE	AVOYELLES	2N	6E	1964		7527	4		52,065				
ZENORIA	LA SALLE	9N	1E	1938	30	1612	118					FIRST WILCOX	SPA

Set B: Wilcox Oil and Gas Fields by Parish

PARISH	FIELD NAME	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
ALLEN	OBERLIN	6S	4W	1946	47	12650	14		57	1,515,434	46,235,869		CKF
ALLEN	OBERLIN SE	5S	3W	1952	49	11976	2		24,115	1,665	30,427		
AVOYELLES	BAYOU JEANSONNE	2N	6E	1963	48	7343	1		4,888				
AVOYELLES	BAYOU TWISTY	3N	5E	1952	43	7402	1		20,535			BAYOU TWISTY	
AVOYELLES	BORDELONVILLE	2N	5E	1951	49	8411	1		9,808			BEE BRAKE	
AVOYELLES	DAVID HAAS	2S	2E	1956		8470	29					FIRST WILCOX	
AVOYELLES	DAVID HAAS	2S	2E	1947	56	8562			13,206,727		371	SECOND WILCOX	
AVOYELLES	EOLA	2S	3E	1939		8446	126		33,594,541	116,324	3,946,671	FIRST WILCOX	CKF
AVOYELLES	FIVE MILE BAYOU	3N	7E	1963	45	6969	27		3,095,351				
AVOYELLES	FIVE MILE BAYOU	3N	7E	1965	36	7399							
AVOYELLES	LAKE OPHELIA	3N	6E	1963	40	4190	1		346,276				
AVOYELLES	LAKE OPHELIA E	3N	6E	1963	45	6903	2		1,653				
AVOYELLES	LAKE ROSEAU	1N	6E	1963	45	8954	1		419			"GOULD	
AVOYELLES	MARKSVILLE	2N	4E	1948	50	7926	15		2,123,550			LA. DELTA #81	
AVOYELLES	MIDDLE BAYOU	4N	4E	1962	50	6230	7		1,025,529				
AVOYELLES	MILLIGAN BAYOU	2N	7E	1962	45	7400	13		1,225,697				
AVOYELLES	NATCHITOCHES BAYOU	2N	7E	1963	41	7788	3		108,427				
AVOYELLES	POINT BASSE	3N	6E	1969		7638	1		10,880				
AVOYELLES	PRAIRIE BAYOU	4N	3E	1963	43	6110			12,630				
AVOYELLES	THREE MILE BAYOU	3N	7E	1963	40	7328	2		4,661				
AVOYELLES	VICK	3N	4E	1966		6721	44		103,469				
AVOYELLES	WOLF PRAIRIE	2N	6E	1964		7527	4		52,065				
BEAUREGARD	ALLIGATOR LAKE	4S	12W	1958	45	10684	2		29,672				
BEAUREGARD	BANCROFT	6S	13W	1965	50	10191	65		8,893,396	415,564	9,612,114		CKF
BEAUREGARD	BANCROFT	6S	13W	1964	47	10296							CKF
BEAUREGARD	BANCROFT N	5S	13W	1949	40	9300	21		11,587,275	758	12,465		
BEAUREGARD	BANCROFT S	6S	13W	1948	40	10194	10						
BEAUREGARD	BANCROFT S	6S	13W	1948	36	10239			704,317	251,974	1,809,677		
BEAUREGARD	BEAR HEAD CREEK S	6S	11W	1966	47	10889	15		1,940,673	145,154	1,035,017		CKF

PARISH	FIELD NAME	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
BEAUREGARD	BIVENS	5S	12W	1964	35	9432	24						CKF
BEAUREGARD	FIELDS	6S	12W	1965	51	10460	27		1,523,142	5,229,223	30017566		CKF
BEAUREGARD	FIELDS	6S	12W	1966		11022		G					CKF
BEAUREGARD	GORDON W	7S	9W	1967	53	13226	4		570,703	580	5,800		
BEAUREGARD	HURRICANE CREEK	5S	8W	1943		14528	44		11,480,311	1,671	775,639		CKF
BEAUREGARD	MERRYVILLE	3S	12W	1955	38	7961	9		1,843,318	11,260	80,579		
BEAUREGARD	MERRYVILLE	3S	12W	1961	53	10488		G					
BEAUREGARD	MERRYVILLE	3S	12W	1959	57	10689							
BEAUREGARD	NEALE	3S	11W	1940	46	11600	78		21,668,080	38,232	895,366		?
BEAUREGARD	ORETTA W	6S	11W	1966	45	10832	3		12,517	64,306	2,601,946		CKF
BEAUREGARD	PINE GROVE	5S	12W	1945	46	11350	1		2,050				
BEAUREGARD	TULLA E	4S	8W	1953	52	12668	2		114,189				
CALDWELL	BANKS SPRINGS	13N	3E	1971		1828	14	G				ADAS SD	
CALDWELL	BANKS SPRINGS	13N	3E	1971		2510		G			5,796,508		
CALDWELL	BANKS SPRINGS N	13N	3E	1973		2452	1				244,775		
CALDWELL	BEAUCOUP CREEK	13N	2E	1974		1949	3	G			1,320,237		
CALDWELL	BURLINGTON	11N	3E	1969		2800	2	G			511,760		
CALDWELL	BURLINGTON	11N	3E	1972		2791							
CALDWELL	BURLINGTON	11N	3E	1972		2830							
CALDWELL	CLARKS	12N	3E	1941		2173	3	G			2,058,386		
CALDWELL	CLARKS	12N	3E	1967		2730		G					
CALDWELL	CLARKS	12N	3E	1965									
CALDWELL	CLARKS N	12N	3E	1972		1692	4	G			1,733,884		
CALDWELL	CLARKS S	12N	3E	1972		2380	3	G			1,326,231		
CALDWELL	CLARKS W	12N	3E	1974		2582	10	G			3,226,484		
CALDWELL	COLUMBIA	13N	4E	1968		2140	23	G	5,535		12,910,902		
CALDWELL	COLUMBIA	13N	4E	1968		2472		G					
CALDWELL	COLUMBIA E	13N	4E	1974		2685	2	G			137,539		
CALDWELL	COLUMBIA S	13N	4E	1972		2532	5	G			2,368,191		

PARISH	FIELD NAME	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
CALDWELL	COLUMBIA W	13N	3E	1975		1736	3	G			465,158		
CALDWELL	COOPER	13N	3E	1974		2494	1	G			184,580		
CALDWELL	COTTON PLANT	13N	2E	1975		2266	35	G			43,451,438		
CALDWELL	GRAYSON	12N	3E	1969		2219	1	G			166,712		
CALDWELL	GRAYSON N	13N	3E	1972		2494	3	G			372,078		
CALDWELL	HUMBLE LAKE	14N	4E	1976		2635	2			228,888			
CALDWELL	LONG LAKE	13N	4E	1974		2488	1	G			324,073		
CALDWELL	LOST CREEK	14N	3E	1975		2036	1	G			234,166		
CALDWELL	MOUNT PLEASANT	13N	3E	1971		2156	4				1,468,185		
CALDWELL	PISTOL THICKET	12N	3E	1979		2650	9	G			4,603,149		
CALDWELL	SARDIS CHURCH	12N	2E	1963		2210	15	G			9,552,487		
CATAHOULA	BABAYS LAKE	5N	5E	1979	44		1						
CATAHOULA	BAYOU LOUIS	9N	8E	1966	41	4239	9		1,203,631			TEW LAKE	
CATAHOULA	BIG BAYOU	6N	5E	1952	39	5152	12		1,879,354			BIG BAYOU	
CATAHOULA	BIG LARTO BAYOU	4N	5E	1972	37	5826	4		134,116				
CATAHOULA	BOLTNER'S BRAKE	6N	5E	1960	41	4915	3		411,190			SCIVALLY	
CATAHOULA	CALIFORNIA BAYOU	7N	6E	1960	39	3851	10		1,427,876			STEWART "B"	
CATAHOULA	CALIFORNIA BAYOU	7N	6E	1965		4628						A-1	
CATAHOULA	CARR LAKE	7N	6E	1958	42	5187	5		230,556			E-5	
CATAHOULA	CROSS BAYOU	5N	5E	1970		5296	3		296,448				
CATAHOULA	GLADE	6N	6E	1968	38	5505	4		161,501				
CATAHOULA	HARRISONBURG	9N	7E	1955	43	4185	28		3,946,663			TEW LAKE	
CATAHOULA	HARRISONBURG	9N	7E	1955								MILLER	
CATAHOULA	HONEY BRAKE LAKE	5N	6E	1971	43	5031	5		625,907				
CATAHOULA	HUDSON BRAKE	6N	5E	1970	46	5176	1		77,060				
CATAHOULA	JENA S	8N	3E	1941	35		19		708,943	1,833	506,358		
CATAHOULA	JONESVILLE	8N	7E	1966	38	4816	4					MILLER	
CATAHOULA	KINCAID BAYOU E	6N	7E	1968	38	6090	2		26,069				
CATAHOULA	LARTO	4N	5E	1964	38	6188	1		56,075				

PARISH	FIELD NAME	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
CATAHOULA	LARTO LAKE	5N	5E	1941	39	5110	49		4,073,394			E-2	
CATAHOULA	LARTO LAKE	5N	5E	1941								C-7	
CATAHOULA	LARTO LAKE E	5N	6E	1949		5855			1,523,556			BELTZHOOVER	
CATAHOULA	LARTO LAKE E	5N	6E	1949								BEE BRAKE	
CATAHOULA	LARTO LAKE S	4N	5E	1949	38	5834			2,746,447			MILLER	
CATAHOULA	LARTO LAKE S	5N	6E	1949								ARTMAN	
CATAHOULA	LONG BRANCH	5N	5E	1959	41	4935	12		1,120,475			BEE BRAKE	
CATAHOULA	LORRON LAKE	4N	6E	1979	38	6813	1		6,009				
CATAHOULA	MEAN LAKE	9N	7E	1957	42	4371	38		5,799,522			TEW LAKE	
CATAHOULA	MEAN LAKE	9N	7E	1957								A-1	
CATAHOULA	MITTEN LAKES	4N	5E	1951		5900	2					MILLER	
CATAHOULA	MITTEN LAKES SW	4N	5E	1952		6500	2					BEE BRAKE	
CATAHOULA	MITTEN LAKES SW	4N	5E	1952								LA. DELTA #81	
CATAHOULA	PARKER LAKE	5N	7E	1966	30	4530	30						
CATAHOULA	PARKER LAKE	5N	7E	1965		6396			3,843,600				
CATAHOULA	PATTON CHURCH	8N	6E	1956	44	4471	44		9,056,694			TEW LAKE	
CATAHOULA	POOL LAKE	8N	7E	1961	42	4567	33					LANCASTER	
CATAHOULA	POOL LAKE	8N	7E	1950	38	4638			2,374,096			TEW LAKE	
CATAHOULA	POOL LAKE W	8N	7E	1952	38	4535	1		46,147			TEW LAKE	
CATAHOULA	PRICHARD S	10N	6E	1959	39	4125	6		624,425				
CATAHOULA	RAWSON CREEK	10N	6E	1969	41	3906	14		1,654,668				
CATAHOULA	SALINE LAKE	4N	5E	1948	46	5506			11,311,361			E-5	
CATAHOULA	SALINE LAKE	4N	5E	1948								LA DELTA #8	
CATAHOULA	SALINE LAKE	4N	5E	1948								BIG BAYOU	
CATAHOULA	SANDY LAKE	8N	6E	1964	33	4298	26		222,515				SPA
CATAHOULA	SERENA	5N	6E	1967	42	5230	3		110,271			E-2	
CATAHOULA	SHOE BAYOU	4N	5E	1969	43	5998	2		34,878				
CATAHOULA	SHOE BAYOU	4N	5E	1972	43	6143						HUDSON	
CATAHOULA	TEW LAKE	8N	6E	1956	42	4272	63		9,589,965			E-2	

PARISH	FIELD NAME	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
CATAHOULA	TEW LAKE	8N	6E	1956								TEW LAKE	
CATAHOULA	WALLACE LAKE	8N	6E	1960								TEW LAKE	
CATAHOULA	WILLOW LAKE	6N	6E	1961	45	4991	12					E-2	
CATAHOULA	WILLOW LAKE	6N	6E	1967	50	5059						E-5	
CATAHOULA	WILLOW LAKE	6N	6E	1941	37	5530			1,315,528				
CATAHOULA	WILLOW LAKE N	6N	6E	1964	40	4947	3		198,797				SPA
CONCORDIA	BALLINA	8N	8E	1965		4784	5		538,289			TEW LAKE	
CONCORDIA	BAYOU COCODRIE N	5N	8E	1953	47	6478	9		499,332			C-7	
CONCORDIA	BAYOU COCODRIE S	3N	8E	1953	43		1					WILDS	
CONCORDIA	BAYOU COCODRIE W	4N	8E	1951	48	6944	9		593,568			YAKEY	
CONCORDIA	BAYOU COCORDIE	7N	4W	1951	47	6944	3		570,696			BEE CREEK	
CONCORDIA	BAYOU COCORDIE MID	4N	8E	1974	47	6708	4		332,798				
CONCORDIA	BEE BRAKE	4N	6E	1953	38	6776	34		3,239,336			BEE BRAKE	
CONCORDIA	BEE BRAKE	4N	6E	1972	39							"TWISTER	
CONCORDIA	BEE BRAKE N	4N	6E	1964	42	6148	27		3,223,866			C-7	
CONCORDIA	BISLAND BAYOU	8N	10E	1974	46	5813	2		46,595				
CONCORDIA	BLACK HAWK	2N	8E	1954	46	8009	11		1,683,056			C-7	
CONCORDIA	BLACK HAWK	2N	8E	1954								BEE BRAKE	
CONCORDIA	BOGGY BAYOU	7N	7E	1964	41	5141	9		2,222,704				
CONCORDIA	BOGGY BAYOU	7N	7E	1965		5475						STRAY	
CONCORDIA	BOUGERE	4N	9E	1955	49	6613	27		1,568,294			MILLER	
CONCORDIA	BOUGERE	4N	9E	1964	49	7131							
CONCORDIA	BOUGERE	4N	9E	1964	41	5632							
CONCORDIA	BOUGERE N	4N	9E	1965		5480	10						
CONCORDIA	BOUGERE N	4N	9E	1965		6726			1,387,356				
CONCORDIA	BRABSTON	4N	8E	1955	46	6311	10		1,153,295			TEW LAKE	
CONCORDIA	BRABSTON	4N	8E	1955								MILLER	
CONCORDIA	CATFISH BAYOU	3N	7E	1963	42	6378	6		294,327			MILLER	
CONCORDIA	CATFISH BAYOU W	3N	7E	1967	40	7326	2		69,711			MINTER	

PARISH	FIELD NAME	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
CONCORDIA	CHANEY LAKES	3N	7E	1949	52	6918	2		53,444			MILLER	
CONCORDIA	CHANEY LAKES	3N	7E	1965		7698						STRAY	
CONCORDIA	CLAYTON	8N	10E	1954	44	5146	53		4,948,414			MILLER	
CONCORDIA	CLAYTON	8N	10E	1965		4927						TURNER	
CONCORDIA	CLAYTON	8N	10E	1965								ARTMAN	
CONCORDIA	COCODRIE LAKE	6N	7E	1965		5400	9		853,603			MILLER	
CONCORDIA	CROSS COCODRIE	6N	8E	1957	45	5511	1		1,701			MILLER	
CONCORDIA	DEER PARK	5N	9E	1950	45	4711	10		375,207			QUINN BAYOU	
CONCORDIA	DEER PARK	5N	9E	1950								TEW LAKE	
CONCORDIA	DEER PARK	5N	9E	1950								ARTMAN	
CONCORDIA	DOBBS BAY	3N	8E	1979	47	7214	3						
CONCORDIA	ESPERANCE POINT	5N	9E	1950	45	6327	100		21,781,156			CAMPBELL	
CONCORDIA	ESPERANCE POINT	5N	9E	1950	44	4798						QUINN BAYOU	
CONCORDIA	ESPERANCE POINT	5N	9E	1950								SECOND WILCOX	
CONCORDIA	ESPERANCE POINT	5N	9E	1950								ARTMAN	
CONCORDIA	ESPERANCE POINT	5N	9E	1950								C-7	
CONCORDIA	ESPERANCE POINT	5N	9E	1950								CAMPBELL	
CONCORDIA	ESPERANCE POINT	5N	9E	1965								TEW LAKE	
CONCORDIA	FAIRCHILD BEND	8N	10E	1979	45	5529	2		250,674				
CONCORDIA	FAIRVIEW	4N	9E	1950	46	6680	28		11,272,644			CAMPBELL	
CONCORDIA	FAIRVIEW	4N	9E	1950								ARMSTRONG	
CONCORDIA	FAIRVIEW	4N	9E	1950								BAKER	
CONCORDIA	FAIRVIEW	4N	9E	1950								PARKER	
CONCORDIA	FAIRVIEW	4N	9E	1950								E-5	
CONCORDIA	FAIRVIEW	4N	9E	1950								BEE BRAKE	
CONCORDIA	FLOAT BAYOU	7N	8E	1965		5577	11		1,719,770				
CONCORDIA	FROGMORE	8N	8E	1958	38	4950	21		2,651,307			MILLER	
CONCORDIA	GILES BEND	8N	10E	1971	47	5506	15		3,438,691				
CONCORDIA	HORSESHOE	6N	7E	1953	39	5310	12		1,953,532			TEW LAKE	

PARISH	FIELD NAME	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
CONCORDIA	HORSESHOE N	7N	7E	1959	36	5245	3		93,891			TEW LAKE	
CONCORDIA	LAKE CURRY	4N	6E	1961	48	6608	40		6,162,511				
CONCORDIA	LAKE ST JOHN	9N	10E	1942		4500	321					FIRST WILCOX	SPA
CONCORDIA	LAKE ST JOHN	9N	10E	1942								SECOND WILCOX	
CONCORDIA	LAKE ST JOHN	9N	10E	1942								"3900-FT."	
CONCORDIA	LAKE ST JOHN	9N	10E	1942								A-1	
CONCORDIA	LISMORE LANDING	6N	7E	1951	44	5294			3,683,556			E-2	
CONCORDIA	LISMORE LANDING	6N	7E	1951								TEW LAKE	
CONCORDIA	LISMORE LANDING	6N	7E	1951								E-5	
CONCORDIA	LOWER SUNK LAKE	2N	8E	1960	43	5923	22		2,045,101			SECOND WILCOX	
CONCORDIA	MADKIN BAYOU	6N	8E	1964	45	5866	1		196,824			SALINE LAKE	
CONCORDIA	MILESTONE FORKS	8N	10E	1954	45	5130	17		2,481,172			TURNER (MF)	
CONCORDIA	MILESTONE FORKS	8N	10E	1954		5299						LANCASTER	
CONCORDIA	MILESTONE FORKS	8N	10E	1954								TURNER	
CONCORDIA	MILESTONE FORKS	8N	10E	1954								ARTMAN	
CONCORDIA	MONTEREY	6N	7E	1959	47	5644	1		34,656			TURNER	
CONCORDIA	MONTEREY S	5N	7E	1959	43	5801	21		1,500,160			MILLER	
CONCORDIA	MORO	7N	7E	1960	27	3737	1		771			STEWART "A"	
CONCORDIA	NATCHEZ ISLAND	7N	10E	1958	45	6791	11		1,074,087			CAMPBELL	
CONCORDIA	NATCHEZ ISLAND	7N	10E	1965		5801						FOSTER	
CONCORDIA	OMEGA	7N	7E	1958	43	4911	17		1,513,381			E-2	
CONCORDIA	OMEGA E	7N	7E	1958								TURNER	
CONCORDIA	OMEGA E	7N	7E	1958								ARTMAN	
CONCORDIA	PLOUDEN BAYOU	6N	8E	1975		6024	5		353,153				
CONCORDIA	QUINN BAYOU	5N	8E	1955	40	4817	2		212,494			QUINN BAYOU	
CONCORDIA	RED RIVER BAY	2N	8E	1963	47	7765	37		5,102,642	13,174	128,838		
CONCORDIA	RIFLE POINT	5N	10E	1952	39	4016	3		150,418			QUINN BAYOU	
CONCORDIA	RIFLE POINT S	8N	10E	1963	46	5421	10		1,363,162				
CONCORDIA	ROSELAND	4N	9E	1953		6606	69		9,546,643			LANCASTER	

PARISH	FIELD NAME	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
CONCORDIA	ROSELAND	4N	9E	1953	46	6749						ARTMAN	
CONCORDIA	ROSELAND	4N	9E	1953								CAMPBELL	
CONCORDIA	ROSELAND	4N	9E	1953								PARKER	
CONCORDIA	ROSELAND	4N	9E	1953								E-5	
CONCORDIA	ROSS BAYOU	6N	7E	1952	43	5088	40		7,506,637			E-2	
CONCORDIA	ROSS BAYOU	6N	7E	1952								E-5	
CONCORDIA	VIDALIA	7N	10E	1949	45	5665	13		1,718,809			TURNER	
CONCORDIA	VIDALIA	7N	10E	1949								ARTMAN	
CONCORDIA	VIDALIA	7N	10E	1949								NICHOLS	
CONCORDIA	VIDALIA S	7N	10E	1968	46	5653	7		3,077,460				
CONCORDIA	WAVERLY POINT	7N	10E	1954	44	5546	7		411,802			TURNER	
CONCORDIA	WAVERLY POINT	7N	10E	1954								ARTMAN	
CONCORDIA	WHITE'S BAYOU	5N	8E	1960	38	4700	1		8,106			QUINN BAYOU	
CONCORDIA	WHITE'S BAYOU N	6N	8E	1972	45	6195	4		513,116				
CONCORDIA	WILD COW BAYOU	5N	7E	1964	49	6179	1		17,103				
CONCORDIA	WILDSVILLEE	7N	7E	1951	40	4830	19		1,015,778			E-2	
CONCORDIA	WILDSVILLEE	7N	7E	1964	38	4920						WILDS, C-5	
E BATON ROUGE	ALSEN	5S	1W	1957	37	10104	6		969,001				
EVANGLINE	BEACONS GULLY	5S	1E	1963	57	11876	15		2,542,672	1,487,524	17,688,117		
EVANGLINE	FENRIS E	5S	1W	1974	46	13528	1			88,977	842,676		
EVANGLINE	MAMOU	5S	1E	1945	48	11520	26		4,487,823				
EVANGLINE	PINE PRAIRE	3S	1W	1941		10158	136						L MIO, CKF
EVANGLINE	PINE PRAIRE	3S	1W	1974	38	11468							SPA
EVANGLINE	POINT BLUE	5S	1E	1957	51	11632	1		1,603	93,723	1,436,009		
EVANGLINE	REDDELL	4S	1W	1957	47	10470	53						SPA
EVANGLINE	VILLE PLATTE	3S	2E	1937		9900	304		61,556,047	3,933,138	187,012,764		SPA
EVANGLINE	VILLE PLATTE	3S	2E	1937		10090							
EVANGLINE	VILLE PLATTE	3S	2E	1937		10227							
GRANT	ALOHA	7N	4W	1953	45	4290	7		606,087				

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GRANT	COLFAX	7N	4W	1979			3		155,327				
GRANT	MONTGOMERY	8N	5W	1952		3447	1				3,019		
GRANT	SELMA	9N	1E	1957		1821	32		1,094,691			FIRST WILCOX	
LA SALLE	BAYOU CASTOR	11N	2E	1960		2607	3						
LA SALLE	CATAHOULA LAKE	6N	4E	1942	36	3814	65		21,014,932			C-5	
LA SALLE	CATAHOULA LAKE	6N	4E	1942								LONG SLOUGH	
LA SALLE	CATAHOULA LAKE	6N	4E	1942								E-5	
LA SALLE	CATAHOULA LAKE	6N	4E	1942								C-7	
LA SALLE	CATAHOULA LAKE	6N	4E	1942								LA. DELTA #12	
LA SALLE	CATAHOULA LAKE	6N	4E	1942								LA. DELTA #81	
LA SALLE	CATAHOULA LAKE	6N	4E	1964	48	4503							
LA SALLE	CATAHOULA LAKE N	7N	4E	1951	36	4112	1					LONG SLOUGH	
LA SALLE	CATAHOULA LAKE W	6N	3E	1949	40	2600	68					C-7	
LA SALLE	CATAHOULA LAKE W	6N	3E	1949		3400						BEE BRAKE	
LA SALLE	CATAHOULA LAKE W	6N	3E	1949		4000			15,791,365				
LA SALLE	CHICKASAW CREEK	11N	3E	1968		2214	2	G			201,224		
LA SALLE	CYPRESS BAYOU	6N	4E	1941	44	4303	38		1,018,204			C-5	
LA SALLE	CYPRESS BAYOU	6N	4E	1969		4291						SCIVALLY	
LA SALLE	ELM RIDGE	6N	4E	1942	41	4752	3		32,286			CAMPBELL	
LA SALLE	ELM RIDGE W	6N	4E	1953	42	4737	1		102,925			SCIVALLY	
LA SALLE	FRENCH FORK	6N	4E	1955	43	4458	10		970,128			C-7	
LA SALLE	FRENCH FORK S	6N	4E	1969	46							SALINE LAKE	
LA SALLE	FRENCH FORK S	6N	4E	1969	48	4343	5		694,992			CAMP	
LA SALLE	INDIAN BAYOU	6N	3E	1942	42	4294	8		958,768			INDIAN BAYOU	
LA SALLE	JENA S	8N	3E	1941	35	3272			1,435,465	1,981	582,056		
LA SALLE	LITTLE BAYOU	8N	1E	1954	36	3486			0				
LA SALLE	LITTLE CREEK	9N	2E	1941		2400	289		17,381,843	49,397	6,621,071		
LA SALLE	LONG SLOUGH	5N	4E	1957	45	3989	13		1,878,092			LONG SLOUGH	
LA SALLE	LONG SLOUGH	5N	4E	1957								C-7	

PARISH	FIELD NAME	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
LA SALLE	MUDDY BAYOU	5N	4E	1952	45	5195	1		114,073			C-7	
LA SALLE	MUDDY BAYOU E	6N	4E	1970		4254	3						
LA SALLE	MUDDY BAYOU E	6N	4E	1971	48	4076			114,073				
LA SALLE	NEBO-HEMPHILLE	7N	3E	1940	37	3340	311		84,428,977	6,097	5,257,172		CKF
LA SALLE	NEBO-HEMPHILLE	7N	3E	1940									SPA
LA SALLE	OLLA	10N	2E	1940	30	2040	443						
LA SALLE	OLLA	10N	2E	1940		3349			82,677,601	6,971	92,824,027		
LA SALLE	OLLA S	10N	2E	1941		2500	14		1,378,000				
LA SALLE	OLLA W	10N	2E	1957	30	2788	1		100				
LA SALLE	RABBIT BRANCH	11N	3E	1973		2886	3					RUSS	
LA SALLE	ROGERS	6N	3E	1951	42	3984	41		4,133,245			A-1	
LA SALLE	ROGERS	6N	3E	1951								UNKY	
LA SALLE	ROGERS	6N	3E	1951								E-2	
LA SALLE	ROGERS	6N	3E	1951								TEW LAKE	
LA SALLE	ROGERS	6N	3E	1951								MILLER	
LA SALLE	ROGERS	6N	3E	1951								BEE BRAKE	
LA SALLE	ROGERS	6N	3E	1951								LA DELTA #12	
LA SALLE	SALINE LAKE N	5N	4E	1950	43	4990	8		1,295,184			TEW LAKE	
LA SALLE	SALINE LAKE N	5N	4E	1950								LA. DELTA #8	
LA SALLE	SALINE LAKE N	5N	4E	1950								C-7	
LA SALLE	SALINE LAKE W	5N	4E	1959		5310	3		741,480			LONG SLOUGH	
LA SALLE	SALINE LAKE W	5N	4E	1959								C-7	
LA SALLE	SALINE LAKE W	5N	4E	1959								SCIVALLY	
LA SALLE	SANDY BAYOU	5N	3E	1956	43	4635	19		1,863,423			PARKER	
LA SALLE	SANDY BAYOU	5N	3E	1956								CAMPBELL	
LA SALLE	SEARCY	8N	2E	1960	36	2690	19		1,480,625		2,461		
LA SALLE	SEARCY W	8N	2E	1961	22	1906	24		1,446,516				
LA SALLE	STANDARD	11N	3E	1940		2164	27	G			15,539,221		
LA SALLE	STANDARD N	11N	3E	1967		2662	8	G			9,358,367		

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LA SALLE	SUMMERVILLE	9N	2E	1940	29	2443	34		3,531,076		79,352		
LA SALLE	SWIM LAKE	11N	3E	1967		1898	10	G			5,764,195		
LA SALLE	SWIM LAKE E	11N	3E	1972		2882	1	G			19,422		
LA SALLE	TROUT CREEK	8N	3E	1941	33	3125	96		3,022,987	285	110,892		
LA SALLE	TROUT CREEK	8N	3E	1951									
LA SALLE	TROUT CREEK W	8N	2E	1959	21	2173	3		8,000				
LA SALLE	TULLOS-URANIA	10N	2E	1950	21	1550	1909		56,499,513		2,161,887	FIRST WILCOX	
LA SALLE	ZENORIA	9N	1E	1938	30	1612	118					FIRST WILCOX	SPA
NATCHITOCHES	GALBRAITH	6N	4W	1970	50	5112	3		182,994				
NATCHITOCHES	GORUM	5N	6W	1948	49	5788							
OUCHITA	MONROE	2N	4E	1963		1324							
POINT COUPEE	BAYOU GERANCE	5S	8E	1964	42	11628	4		344,247				
POINT COUPEE	BAYOU TOMMY	6S	10E	1970	47	12427	2		510,155				SPA
POINT COUPEE	FORDOCHE	6S	8E	1966	49	13784	132		45,657,097	2,714,429	174,724,714		
POINT COUPEE	FORDOCHE	6S	8E	1966	49	13983							
POINT COUPEE	FRISCO	6S	9E	1964	44	11585	39		4,068,906				SPA
POINT COUPEE	LIVONIA	6S	9E	1965	49	12802	68		8,266,587				
RAPIDES	BIG ISLAND	4N	3E	1942	48	4796	106		10,702,364			TEW LAKE	TUSC
RAPIDES	BIG ISLAND	4N	3E	1942								C-5	CR
RAPIDES	BIG ISLAND	4N	3E	1942								CAMPBELL	
RAPIDES	BIG ISLAND	4N	3E	1942								E-5	
RAPIDES	BIG ISLAND	4N	3E	1942								LA. DELTA #8	
RAPIDES	BIG ISLAND	4N	3E	1942								C-7	
RAPIDES	BIG ISLAND	4N	3E	1942								BEE BRAKE	
RAPIDES	BIG ISLAND	4N	3E	1942								LA. DELTA #12	
RAPIDES	BIG ISLAND	4N	3E	1942								SCIVALLY	
RAPIDES	BIG ISLAND	4N	3E	1942								DEVILLE	
RAPIDES	BIG ISLAND	4N	3E	1942								HUDSON	
RAPIDES	BIG ISLAND	4N	3E	1942								BIG BAYOU	

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RAPIDES	BIG ISLAND N	5N	3E	1962	44	5053	104		18,273,998			LA. DELTA #8	
RAPIDES	BIG ISLAND N	5N	3E	1963	45	3970						LA. DELTA #12	
RAPIDES	BIG ISLAND N	5N	3E	1965	42	4983							
RAPIDES	BLISS	1N	3W	1952	45	9394	4		215,628				
RAPIDES	CATAHOULA LAKE S	6N	3E	1958	42	4095	28		828,166			TURNER	
RAPIDES	FLATWOODS	5N	5W	1945	48	6488	1		1,112				
RAPIDES	GLENMORA	1S	2W	1950	57	10452	16		2,955,432	58,570	649,527		EOC(GAS)
RAPIDES	GLENMORA	1S	2W	1950									
RAPIDES	GLENMORA	1S	2W	1950									
RAPIDES	GLENMORA	1S	2W	1950									
RAPIDES	HINESTON	2N	4W	1953	44	8591	1		7,854				
RAPIDES	KOLIN	3N	2E	1958	48	6442	1		2,102			A-1	
SABINE	FORT JESUP	7N	10E	1962	24	2188	209						SAR
SABINE	NEGREET	6N	12W	1946		1398							
SABINE	PENDLETON MANY	6N	12W	1964	30	1502	830		21,005,784		65,353		SAR
ST LANDRY	BEGGS	4S	4E	1973	48	11574		G		49,582	703,944		
ST LANDRY	BEGGS	4S	4E	1973	51	11482	1	G					
ST LANDRY	MELVILLE	4S	7E	1948	54	11240	10		569,418	120,467	1,250,352		SPA
ST LANDRY	WASHINGTON S	5S	5E	1958	65	10035	5	G	73,034	199,347	3,234,205		CKF
TENSAS	HOLLY RIDGE	11N	9E	1948	38	3000	96		16,200,829	100,708	49,062,581	FIRST WILCOX	TUSC, PXY(GA
TENSAS	HOLLY RIDGE N	11N	10E	1944	29	3008	1						
TEW LAKE	KINCAID BAYOU	6N	7E	1961	48	5463	19		1,615,275			TEW LAKE	
TEW LAKE	KINCAID BAYOU	6N	7E	1961	44	5957						E-5	
TEW LAKE	KINCAID BAYOU	6N	7E	1962	44	5271						E-2	
W BATON ROUG	MORRISONVILLE	8S	12E	1968	37	9461	1		70,444				
WEST CARROLL	EPPS	19N	10E	1928		1470	40	G			56,004,060	FIRST WILCOX	MGR
WINN	COLGRADE	11N	1W	1959	21	1278	605		16,345,996		290,195	FIRST WILCOX	SPA
WINN	CROSS ROADS	10N	1E	1954	20	1482	210		2,039,841		342,151	FIRST WILCOX	
WINN	CROSS ROADS S	10N	1E	1967	21	1461	4		15,500				

PARISH	FIELD NAME	T	R	YEAR	API (°)	PROD TOP (FT)	TOT. WELL	GAS	CUM. OIL THRU 88 BBL	CUM. COND THRU 88 MCF	CUM. GAS THRU 88 MCF	STANDARD NAME	OTHER PROD
WINN	CURRY	10N	1E	1957	20	1416	41		233,278			FIRST WILCOX	
WINN	CURRY	10N	1E	1961	21	1371							
WINN	DODSON	12N	3W	1971		1972	1		0				
WINN	FLAT CREEK	12N	1E	1970		1764	2	G			486,900		
WINN	FLAT CREEK	12N	1E	1970		1934							
WINN	HICKARY VALLEY	12N	1E	1969		2166	5	G			48,938		
WINN	HICKARY VALLEY N	12N	1E	1974		2338	5	G			1,373,416		
WINN	HICKARY VALLEY N	13N	1E	1976		2138		G					
WINN	HICKARY VALLEY NE	12N	1E	1976		2140	5	G			2,112,795		
WINN	HICKARY VALLEY W	12N	1W	1974		2471	1	G			38,032		
WINN	JOYCE	12N	2W	1949	21	1112	121		1,632,165			FIRST WILCOX	
WINN	NEW PORT	13N	1E	1977		1793		G			2,051,914		
WINN	RICHLAND CREEK	11N	1E	1980		2545		G			1,309,618		
WINN	SALT	10N	1E	1960	21	1409	52		1,282,814			FIRST WILCOX	
WINN	SANDY CREEK	11N	1E	1977		2643		G			3,127,976		
WINN	SIKES E	12N	1W	1967		1842	8	G			3,854,362		
WINN	SIKES E	12N	1W	1967		2104							

VITA

Masaaki Funayama was born in Yamagata City, Japan on December 22, 1958. He recieved a Bachelor of Science from Yamagata University in 1981 and a Master of Science in Geology from Tohoku University in 1983. He worked for five years for Teikoku Oil Company from 1983 to 1988, after which the company provided an opportunity and financial support to study at LSU.

His published works include several articles that he wrote and co-wrote on Miocene radiolarian stratigraphy in northern Japan.

MASTER'S EXAMINATION AND THESIS REPORT

Candidate: Masaaki Funayama

Major Field: Geology

Title of Thesis: Distribution and Migration Patterns of Subsurface Fluids in the Wilcox Group in Central Louisiana

Approved:

Major Professor and Chairman

Dean of the Graduate School

EXAMINING COMMITTEE:

Joseph E. Hazel

Date of Examination:

November 30, 1990