REGIONAL ASSESSMENT OF GEOTHERMAL POTENTIAL ALONG THE BALCONES AND LULING-MEXIA-TALCO FAULT ZONES, CENTRAL TEXAS

Final Report

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EXECUTIVE SUMMARY

The Balcones and Luling-Mexia-Talco Fault Zones delineate a belt that stretches across the central part of Texas from the Rio Grande to the Red River. The fault zones are denoted by broken and displaced strata, and juxtaposition of diverse bedrock types has had a marked effect on natural resources both at the earth's surface and below ground. There have also been demographic responses to the abrupt changes in natural features; many of the major Texas cities, including Austin, Dallas, Fort Worth, San Antonio, and Waco, occur along this trend.

Several Cretaceous aquifers along this belt provide ground water for municipal, industrial, and domestic users; in general, the waters obtained from these aquifers have low temperatures and low concentrations of dissolved solids. However, in some areas the only available water supply occurs in the deepest, downdip parts of the aquifer, and there, water temperature values are anomalously high--locally as much as 60 °C (140 °F). For many years these warm and locally mineralized waters have supplied municipal and domestic needs, but the heat content was considered a nuisance or an oddity. Warm waters have supplied a few health spas and swimming pools, but in general, the heat content of these waters has been wasted.

This report presents a region-wide inventory and assessment of aquifers known to yield warm water (greater than 90° F; 32 °C). We have conducted this study to ascertain the potential for obtaining geothermal energy for space heating and water heating needs. The aquifers investigated include the Hosston/Trinity Sands, the Hensel Sand, the Paluxy Sand, the Edwards Limestone, and the Woodbine Sand. We have examined each aquifer in terms of its stratigraphic and structural framework and its hydrogeological properties.

Of the aquifers studied, three possess the greatest potential as sources of geothermal energy. They are the Hosston/Trinity, the Paluxy, and the Woodbine. All three provide local municipalities with potable water having elevated temperature. The Edwards and the Hensel, on the other hand, have either adverse water quality, low sustainable yields, or insufficient caloric content.

The Hosston/Trinity aquifer has the greatest geothermal potential of the aquifers studied. That is, the Hosston/Trinity (1) covers the largest area, (2) provides more towns across that area with water, (3) is the deepest (hence, hottest) of the aquifers studied, and (4) has generally moderate dissolved solids content through the area in which it is currently tapped. Our data on well yields are insufficient to project aquifer capabilities for future ground-water withdrawals, but previous workers (Klemt and others, 1975, p. 55) have indicated a potential for future increased pumpage from the downdip parts of the Hosston Sand in Central Texas.

The Woodbine and Paluxy Sands have a moderate geothermal potential in North-Central and northeast Texas, but both aquifer systems have a smaller geographic extent compared with the Hosston/Trinity; also ground water from the Woodbine and Paluxy generally has lower temperatures and higher concentrations of dissolved solids.

If the water obtained from the deep, geothermal parts of the aquifers does not have to be potable, (that is, if it does not have to serve multiple needs), the geothermal resource base will be expanded. Thus, the potential resource will include hot brines that are known to occur in parts of the Edwards Limestone and high-salinity waters that occur within the deeper parts of the various sand aquifers. In fact, current projects to obtain heat from ground water from the Hosston (in Falls County) and the Woodbine (in Navarro County) have selected the parts of the aquifers in which water quality precludes the use of these aquifers as a potable water supply. Geologic conditions in deep parts of the Hosston/Trinity, the Paluxy, and the Woodbine seem favorable for large amounts of hot (but probably saline) waters. These are the deep deltaic deposits that occur in Bowie, Red River, Lamar, Delta, Hopkins, Franklin, and Titus Counties in northeast Texas, but since these deep sands have not been tapped as aquifers, their hydrologic properties are conjectural.

Probably the greatest known geothermal potential along the Balcones and Luling-Mexia-Talco Fault Zones occurs in those areas where warm waters are now being extracted and consumed without regard for the heat value. The rate of pumpage and the difference between prevailing winter air temperature and the ground-water temperature show the magnitude of this resource that is being wasted. Taylor, Texas, for example, pumps enough water at 116^{o} F (47^{o} C) that during winter months approximately 2.07×10^{10} Btu (5.2×10^{9} kg-cal.) is wasted. Part of this heat can probably be extracted economically, because those Btu's dissipated during an average January have a value of as much as $52,000. The retrieval of this heat would entail designation of a recipient, modification of water distribution, and the installation of a heat exchange device. The geologic resource exists, therefore, but its utilization is an engineering and economic problem.

OVERVIEW

General

For more than 80 years, warm waters with temperatures of up to 60° C (140° F) have been produced from several aquifers located along a belt that bisects Texas from the Rio Grande to the Red River. This trend, which is broadly delimited by the Balcones Fault Zone on the west and the Luling-Mexia-Talco Fault Zones on the east (fig. 1), constitutes a low-grade geothermal resource. Waters from aquifers in this region have long supplied municipal and domestic needs, but except at local spas and health resorts, the heat content of these waters has been considered a nuisance and thus wasted. Today, however, because of increased costs of fossil fuels, low-grade energy sources are attracting new attention. The waters produced along this belt provide a potential supply for hot water and space-heating needs, and projects are currently underway to tap this heat source for the Torbett-Hutchings- Smith Memorial Hospital at Marlin and the Navarro Junior College at Corsicana.

Although the heat content of these waters is low, the warm-water-bearing aquifers constitute an appealing potential resource because of the convergence of social and geologic attributes within the region. The belt from which the warm waters are obtained is one of the most heavily populated and intensively used regions in Texas. Total population of the region is more than 5 million with a maximum population density in Dallas County of 1,616 people/mi^2 (624 people/km^2). There are six Standard Metropolitan Statistical Areas and numerous large industrial, military, educational, and institutional facilities that might efficiently use this "alternative energy source" (fig. 2). Perhaps more important than the sheer number and size of potential users of this resource is the aforementioned fact that many communities already tap the warm waters for their municipal water supplies. Thus, the costs of drilling a well and pumping the water have already been borne. In these instances, all that is necessary for using the heat is the designation of a recipient (a local school or other public building, for example) and installation of the necessary heat exchange systems.

However, a water resource of the type studied here--that is, one that provides potable water and caloric energy--is an anomaly. In general, aquifers of moderately shallow depth (up to several hundred feet deep) yield dependable amounts of water of low, constant temperature and low total dissolved solids. But in the deeper parts of

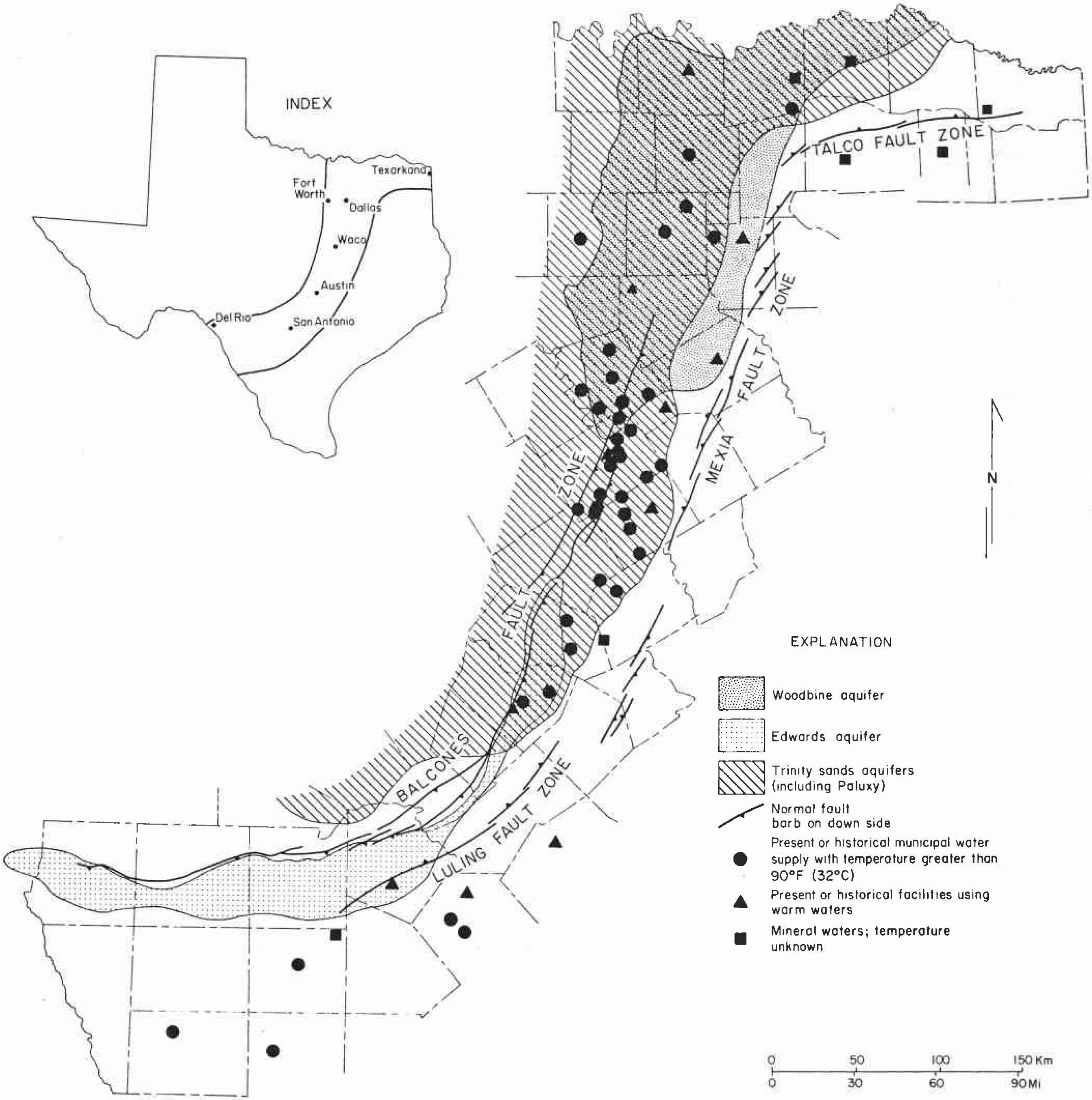


Figure 1. Location of study region in Central Texas; note localities historically producing or using warm (or mineral) waters.

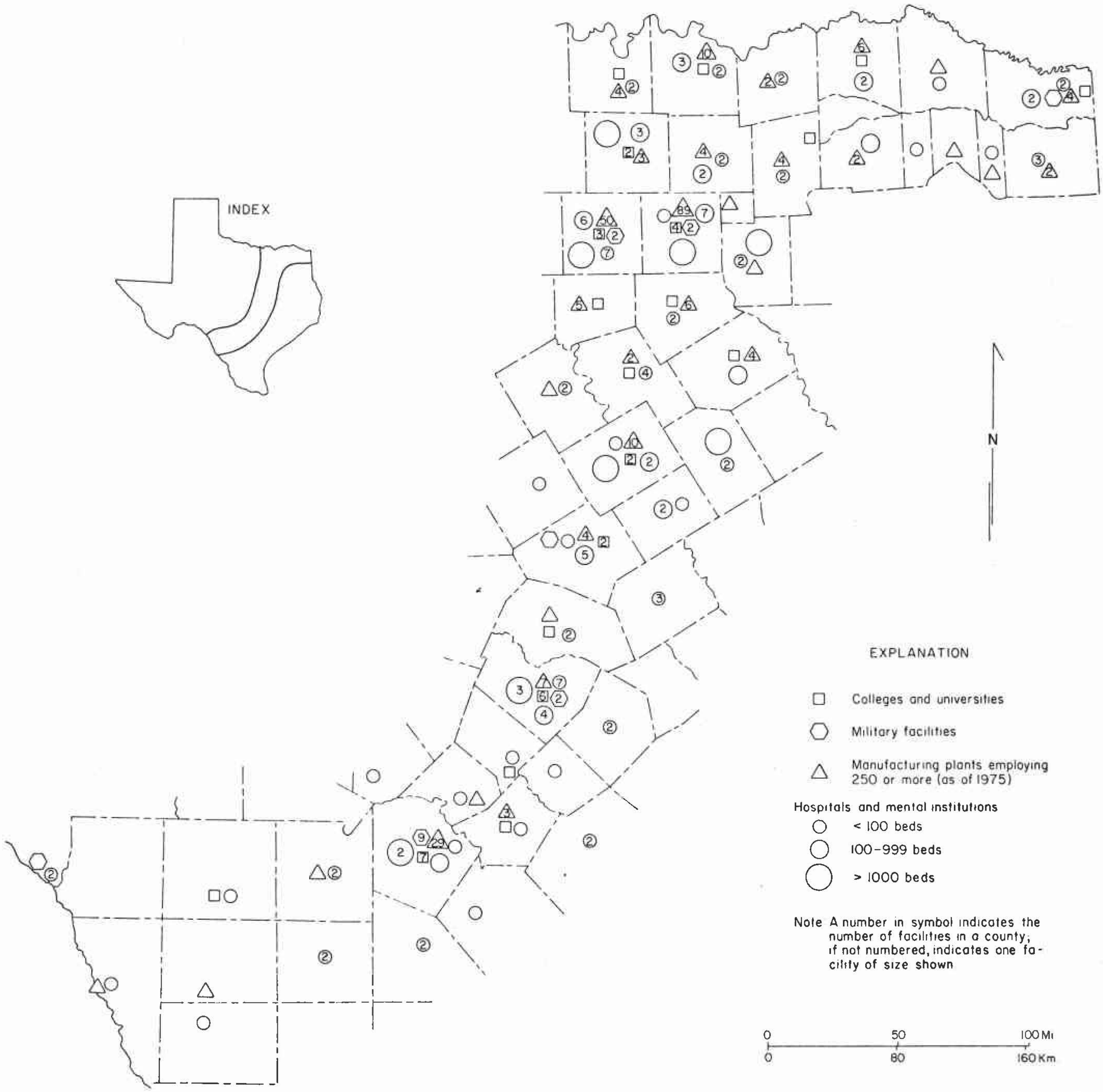


Figure 2. Major facilities within study region (from Arbingast and others, 1976).

aquifers, porosity and permeability commonly decrease with an associated decline in well yields. Also, water quality declines with increasing depth as a result of poor circulation and either chemical equilibrium between deep ground water and minerals composing the host rocks or a mixing of meteoric waters and pre-existing fluids within the aquifer. This increase in dissolved constituents is further abetted by the increase in earth temperature with depth; the hotter the ground water, the greater the capacity of the water to retain salts in solution. Given these expected relations, plus the cost of drilling a well, it is no mystery why wells usually tap the shallowest dependable source of ground water in an area. People naturally seek the best quality water at the lowest cost, and in the past, a hot-water well was considered unsatisfactory for domestic or municipal supply. Many such wells may have been abandoned leaving no record; hence, data on these waters are sometimes sparse.

Clearly, there are several constraints on the widespread use of warm potable water; these constraints include geographic variations in quality, quantity, and heat content of geothermal ground-water reservoirs. These factors combined affect the technical and economic feasibility of tapping the waters either for drinking supply or for heat extraction.

Purpose and Scope

This investigation is a regional inventory and overview. Its purpose is to assess areal and stratigraphic extent and capabilities of aquifers that yield warm waters within the Balcones and Luling-Mexia-Talco Fault Zones. The study involves a state-of-knowledge evaluation of multiple-use potential (potable water and heat content) on the basis of geologic, climatic, and demographic factors. Because multiple use is so important to the viability of this potential energy resource, we have focused our attention mainly on areas of known ground-water production. Thus, our major questions are, "Where are there warm potable waters, and what are their geochemical and hydrologic attributes?" However, we have also delineated as potential targets untested areas that might yield potable geothermal waters. Finally, we have defined possible future research tasks for further assessment of these resources.

The geographic scope of study included a region of more than 50,000 mi^2 (approximately 137,000 km^2) within 65 Texas counties (fig. 3). This study region was defined on the basis of the location of Cretaceous aquifers in Central Texas that are known to yield warm water locally. We purposely excluded areas in which warm waters are confirmed from Tertiary strata in the Gulf Coast Basin in South Texas, and from Paleozoic strata farther west; the Tertiary and Paleozoic aquifers differ from

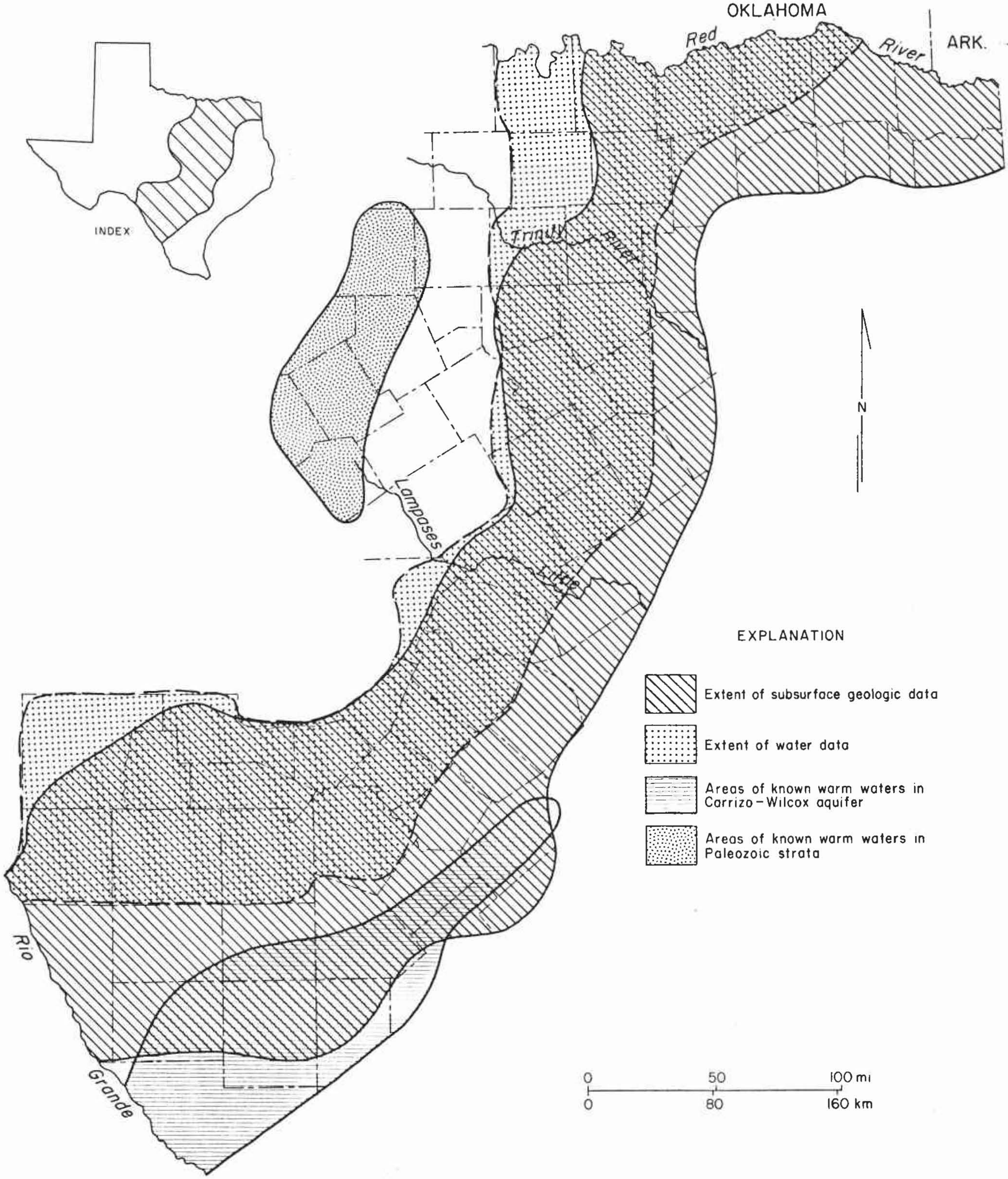


Figure 3. Counties included within geologic data base and hydrologic data base; also approximate limits of Paleozoic and Tertiary aquifers that yield warm water.

the Cretaceous strata in geologic age, in mode of origin, and in areal extent. Time constraints during this one-year project did not allow expansion of the study region to include these adjacent geothermal provinces.

The conceptual scope of study involved two major avenues of inquiry, one dealing with the stratigraphic and structural framework of the aquifers identified, and the other addressing the hydrologic, geochemical, and thermal aspects. Both avenues of investigation, however, were limited by extant data, whether it was information on subsurface lithic control, water quality, or historical well yield. Limited water data especially constrained the scope of study; no ground-water data exist for the rock units studied where they are not used as aquifers. There, aquifer potential must be inferred from our interpretations of the geologic setting. Our interpretations of the regional geologic framework were similarly constrained by uneven distribution and quality of subsurface data. In many areas there has been little petroleum exploration activity, and in several instances where exploration wells do occur, the wells are often cased through the water-bearing units, and thus the formations of interest in this study do not appear on electric logs. The scope of follow-up investigations could be expanded by the acquisition of a more complete data base within selected areas.

Because of the size and complexity of the study region, it has been subdivided into three subareas (fig. 3). The Lampasas and Little Rivers separate the southern area from the central part of the region, and the Trinity River separates the central from the northern sections. The northern and southern areas were studied by scientists at the Bureau of Economic Geology. The central segment was studied under a contractual agreement with a team of consultants led by Drs. O. T. Hayward and Robert G. Font of Baylor University at Waco, Texas. In addition to contributing data and interpretations to the regional assessment, these consultants also completed a state-of-knowledge assessment of the geologic and hydrologic settings in Falls County. The Falls County study provided technical support for drilling a well to supply warm water for the Memorial Hospital at Marlin funded mainly by the U.S. Department of Energy. Maps and reports by these consultants--both on the entire central study area and on Falls County--are on file at the Bureau of Economic Geology.

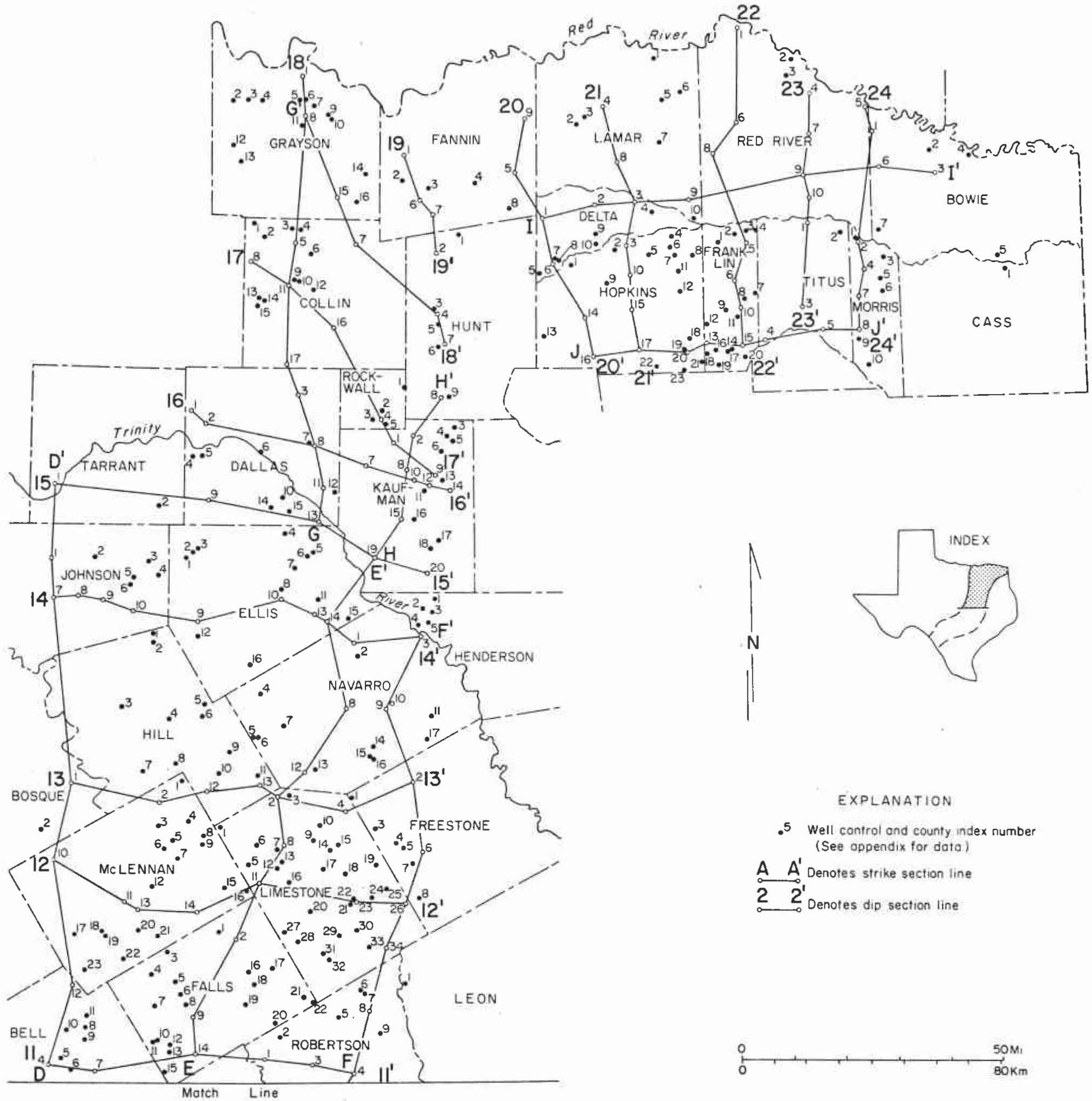
Data Base

Two types of data were used in this inventory. One type is applied to the geologic framework; the other is used in assaying hydrology, water chemistry, and historical use patterns of the aquifers delineated. In all instances, mapping was done at a scale of 1:250,000. The work maps for all three study areas were then compiled into a single base at a scale of 1:1,000,000. These compilation maps are on file at the Bureau of Economic Geology.

The geologic interpretations were based mainly on electric logs of wells occurring across the region, although we also examined some cuttings and cores to substantiate stratigraphic horizons in problem areas. Our well control consists of 724 data points in 63 counties (fig. 4). We used these data to construct 24 dip-oriented and 10 strike-oriented cross sections, as well as a series of 11 maps that present the structural framework of various stratigraphic horizons and the isopachous or isolith geometry of the aquifers studied. Bottom-hole temperature values from these electric logs were also used to construct a map showing the geothermal gradient across the region.

Our subsurface geologic data base was computer indexed and is presented in the appendix to this report. This appendix contains selected information obtained from the electric log heading or from other sources, and it also contains our lithic interpretations. Each data point is located by county numbers (fig. 4) and each well has a unique number code that is compatible with the State well numbering system of the Texas Department of Water Resources. Of the two numbering systems, the county-by-county convention shown in figure 4 is more important in using this report because our interpretative maps and cross sections use this system. Hence, if anyone wants to retrieve data used in any interpretation here, he or she may do so by referring to the appendix by county and number of the well in question.

Most of the geohydrologic data used in this report were obtained from the computer files of the Texas Department of Water Resources, although some data on dissolved solids and temperature were obtained from published reports. Computerized data include several thousand values of water level measurements, water quality and temperature, and municipal ground-water withdrawals. For each aquifer system deemed potentially important as a geothermal resource, the data were treated in two main types of operations. One of these operations was to plot representative points on maps to provide depictions of regional geographic variations in water level, water chemistry, water temperature, and municipal water use. This procedure resulted in the construction of 16 maps. The other operation was to treat the water quality information for each aquifer in the aggregate--that is, in a non-site-specific manner. This entailed running computer programs to plot scattergrams showing the relations among dissolved solids, temperature, and well depth. Finally, water quality data were programmed to show major anion and cation relations using piper diagrams. This was mainly done in an individual county format in order to denote a characteristic


Red River
GRAYSON
FANNIN
LAMAR
RED RIVER
BOWIE
DELTA
HOPKINS
FRANKLIN
TITUS
MORRIS
CASS
COLLIN
HUNT
ROCKWALL
TARRANT
DALLAS
KAUFMAN
Trinity River
JOHNSON
ELLIS
HENDERSON
NAVARRO
HILL
BOSQUE
FREESTONE
McLENNAN
LIMESTONE
LEON
FALLS
BELL
ROBERTSON
Match Line
N
INDEX
EXPLANATION
.5 Well control and county index number (See appendix for data.)
A A' Denotes strike section line
2 2' Denotes dip section line
0 50 Mi
0 80 Km

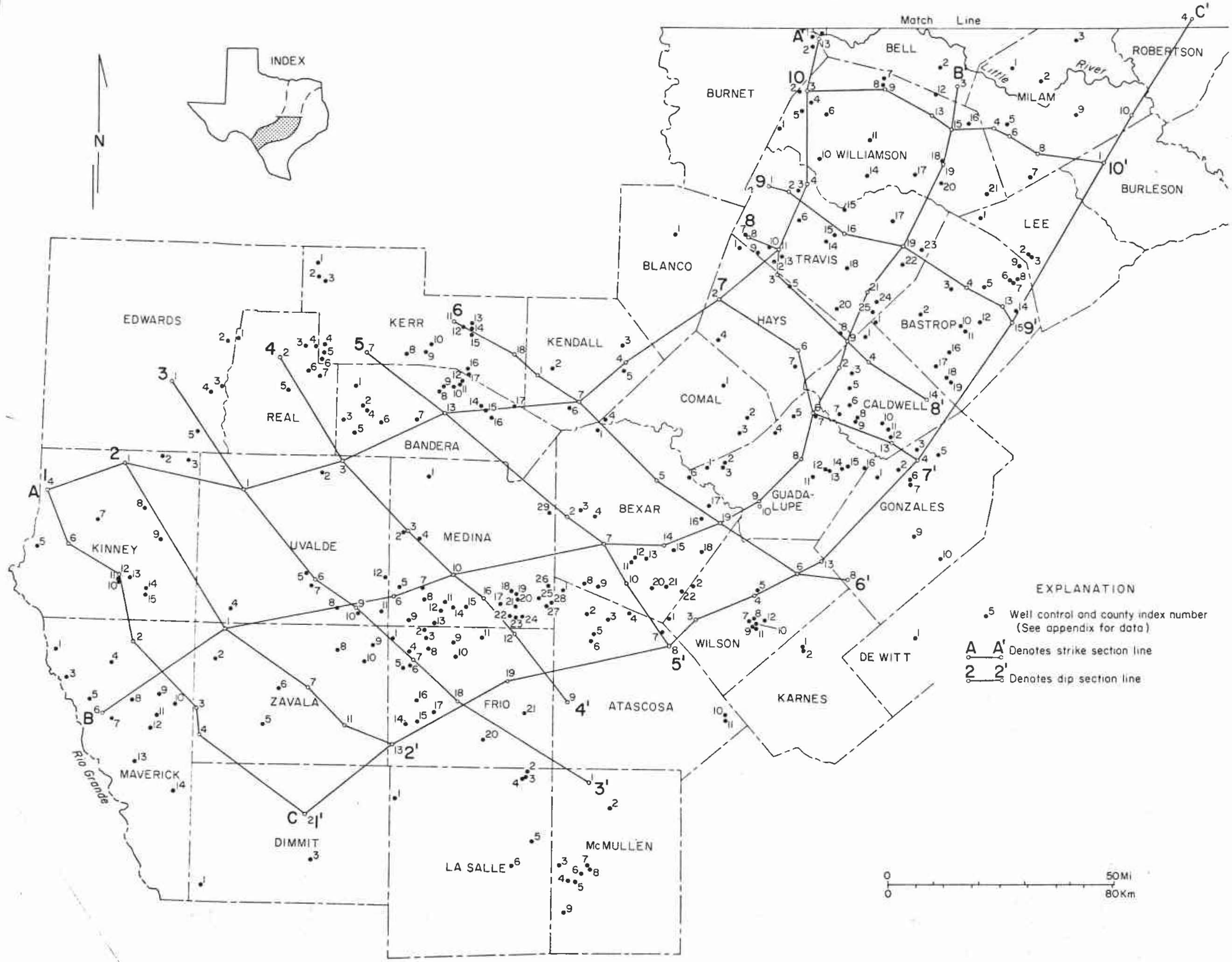


Figure 4. Geologic data base--location of well control and cross-section lines (on facing pages).

geochemical "thumbprint" of a given aquifer, or to show strike-oriented or dip-oriented changes in anion-cation balance within an aquifer.

The data on water quality and water level are not indexed in this report because of the massive repetition of information that is readily obtainable from computer files of the Texas Department of Water Resources. The location-specific information for hydrologic data used in contouring maps presented in this report is retained on the open-file work maps at the Bureau of Economic Geology. These work maps present the water-quality and water-level data base from which the interpretations were drawn. These data are coded by county, by aquifer, and by State well number.

In this report we first present general discussions of regional physiography, climate, structural geology, and stratigraphy. Then we focus on each of the horizons that were mapped in detail, beginning with the pre-Cretaceous "basement complex" and including each of the major Cretaceous aquifers that yield low-temperature geothermal waters. These aquifers are addressed from oldest to youngest.

Regional Physiography and Climate

Most of the large facilities that might potentially use the low-temperature geothermal waters lie along the Blackland Prairie physiographic province (fig. 5). The intensive human use of the Blackland belt is due to several factors. The terrain is gently rolling, and the soils are fertile, so that the area constitutes prime agricultural land. Moreover, especially in the south-central part of the Blackland belt, geologic changes across the Balcones Fault Zone have resulted in marked demographic responses. Most notable are the changes in terrain from the Hill Country and its dominant ranching economy to the inner coastal plain and its cotton-based farming economy. Also, the Balcones Fault Zone delineates the Edwards artesian aquifer system that constitutes a major supply of fresh water in south-central Texas.

Other physiographic provinces that warrant special notice are the Western Cross Timbers and the Eastern Cross Timbers because they generally delimit the recharge areas for the various warm-water-bearing aquifers in Central and North-Central Texas. The Western Cross Timbers receives recharge for all the basal Cretaceous sand units, including the Hosston, the Hensel, the "Trinity Undifferentiated" sand units, and part of the Paluxy Sand. The Eastern Cross Timbers is the recharge zone for the Woodbine Sand.

Climatic factors that are important in evaluating low-temperature geothermal water resources include mean annual air temperature, seasonal (winter) deviations

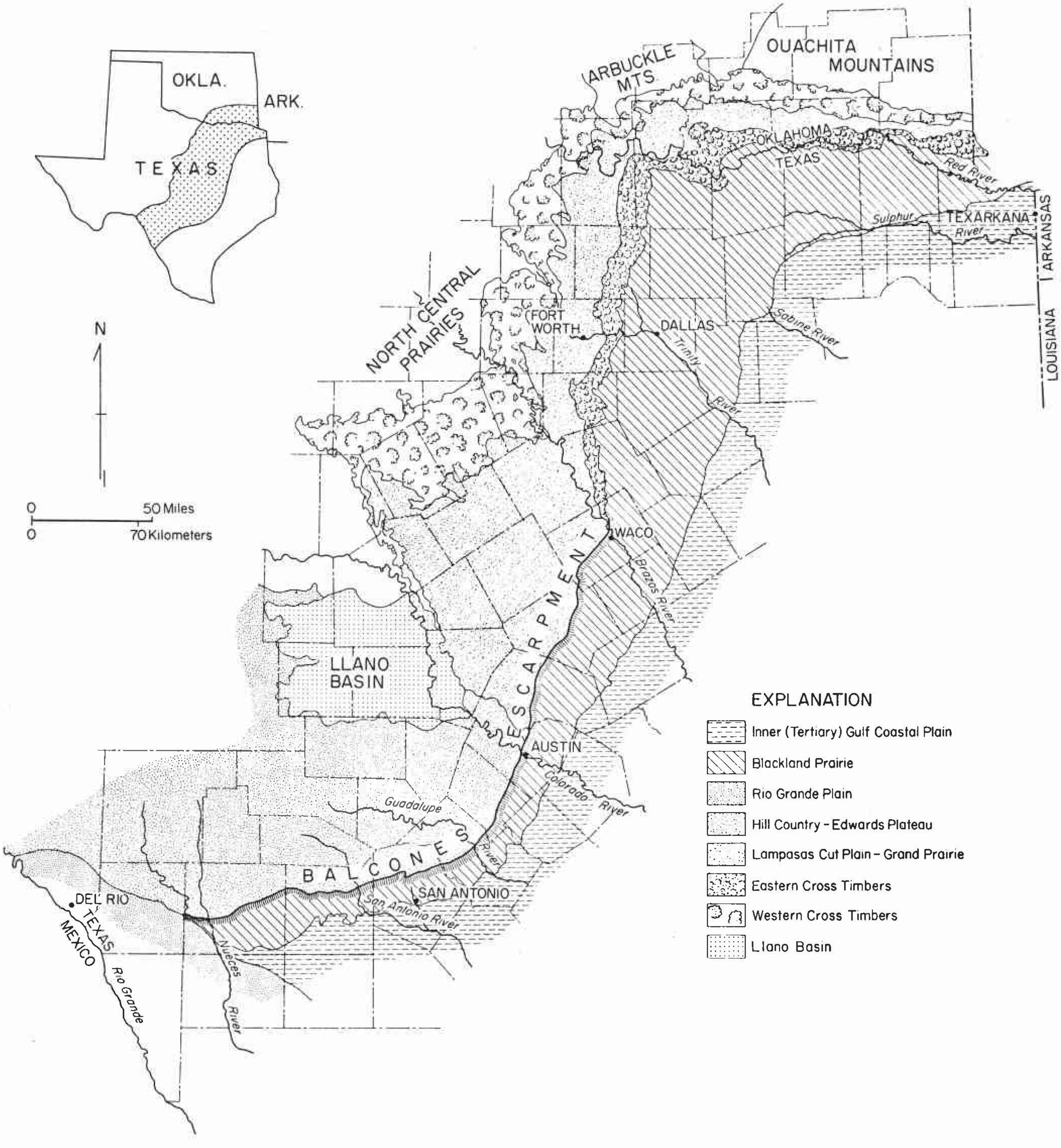


Figure 5. Physiographic provinces of study region.

from this mean, and average length of seasons that are subject to freezing temperature.

Mean annual air temperature (fig. 6) provides a basis for approximating the temperature of water entering the aquifers; in other words, initial aquifer temperature should be close to the mean annual air temperature across the respective recharge areas. Moreover, mean annual air temperature represents a reasonable estimate for near-surface ground temperature, and this value is used as a baseline for computing geothermal gradients.

Mean temperature values for winter months provide a way to compute the effective caloric value of warm waters for space heating needs. Hence, the difference between January mean minimum temperatures (fig. 6) and the temperature of the local ground water provides an approximate maximum figure for available heat, even though the actual usable heat will be somewhat less than this differential, because of heat-exchange efficiencies and other factors. The most conservative estimate of available heat may be obtained by computing the difference between temperatures of geothermal waters and the local mean annual air temperatures, as this value should approximate the difference between temperatures of recharging waters and the waters at depth in the same ground-water system.

The map showing mean length of freeze periods (fig. 7) provides a rough estimate of the length of time during which space-heating needs are greatest. However, in most of Texas there are many warm interludes within this freeze period. Also at other times temperatures may be above freezing but below the range of comfort, so that for a detailed, site-specific analysis the climatic parameter needed is the "annual heating degree days," which is available from National Weather Service data files but is not presented here. The map depicting freeze period does illustrate the brief part of the year in which space heating is needed. But for water-heating needs, the caloric value of the water does not depend on seasonal air temperature, and the demand for hot water implies a year-round need for geothermal water. Yet warm water in storage tanks loses heat, and for this reason hot-water heaters powered by fossil fuels are widely used even in homes that directly tap the geothermal aquifers.

Regional Structural Geology

The study region lies along a major structural hinge that separates the Texas Craton from the embayments of the Gulf coastal province (fig. 8). The hinge occupies a zone as much as 40 mi (64 km) wide that shows evidence of structural activity over an expanse of geologic time. The major tectonic features delimiting the hinge zone

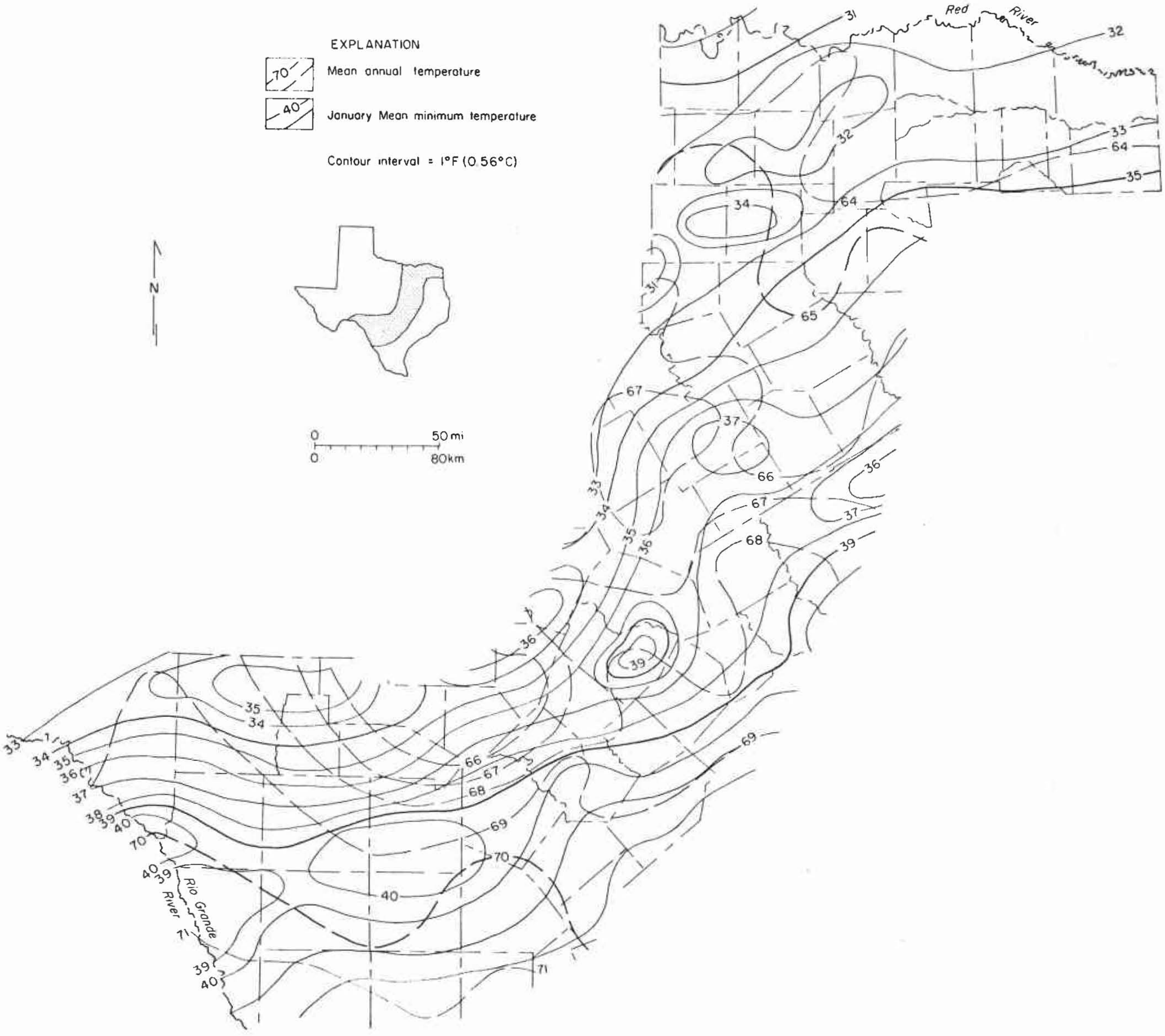


Figure 6. Mean annual air temperature and January mean minimum temperature of study region (data from Texas Natural Resources Information System).

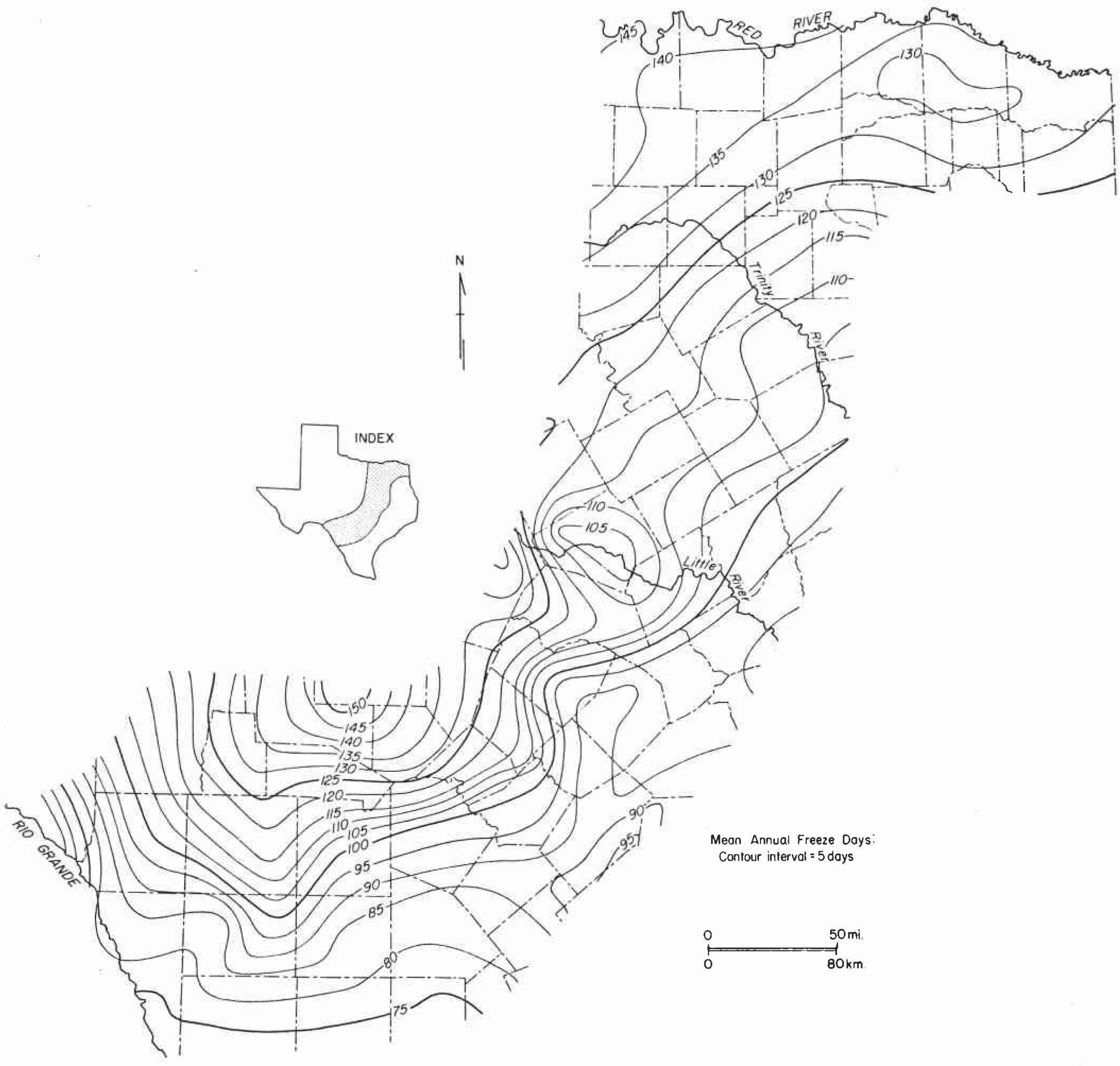


Figure 7. Mean annual freeze period of study region (data from Texas Natural Resources Information System).

are the surface faults of the Balcones and Luling-Mexia-Talco systems and the buried Ouachita structural belt (fig. 9). Other features that lie along this trend are the updip subcrop of Jurassic strata, Cretaceous igneous plugs, and the updip outcrop of Tertiary rocks. Detailed stratigraphic and structural analyses demonstrate facies changes, abrupt thickening and rapid changes in the rate of dips of strata, complex faulting, and anomalously high geothermal gradients. The time of structural deformation spans more than 200 million years from the late Paleozoic during Ouachita deformation to Miocene time when the major events of Balcones faulting occurred. The foundered Ouachita structural belt and the proximity of the Jurassic subcrop suggest that this hinge line was the locus of rifting during the opening of the ancestral Gulf of Mexico at the beginning of the Mesozoic Era. Subsequently, the Balcones and Luling-Mexia-Talco fault systems formed in response to tensional stresses, perhaps related to this rifting. The Balcones Fault System shows displacement mainly down-to-the-coast, whereas the Luling-Mexia-Talco system is displaced both up-to-the-coast and down-to-the-coast, but in many areas a graben occurs superjacent to the Ouachita belt between the Balcones and Luling-Mexia-Talco Fault Zones.

The dominant features that affected the depositional framework of Cretaceous rock units along this hinge zone are the various positive and negative structural features within the region (fig. 8). The three positive elements that were most influential in determining the composition and depositional aspects of Cretaceous sandstone units are the Llano Uplift, the Arbuckle Mountains, and the Ouachita Mountains. All three of these features provided sediment for the basal Cretaceous terrigenous clastic deposits, the downdip areas of which are the major geothermal aquifers. Other positive features of more limited areal extent are the Devil's River Uplift and the Chittim Anticline, both of which are especially denoted by their effects on the structural configuration of the Edwards Limestone in South Texas. In Central Texas, the San Marcos Platform is a major salient extending southeastward from the Llano Uplift. This platform is the locus of several facies changes with concomitant effects on aquifer properties of the Hosston and Hensel sand units. The Muenster Arch and the Preston Anticline affected the sand trends of several units in north Texas. The Sligo Reef Trend delineates the Cretaceous (Comanchean) shelf edge, and the pre-Cretaceous shelf edge is inferred from the location of the updip Jurassic line.

The major negative structural features are the Maverick Basin, the East Texas Basin, and the Gulf Coast Basin. Both the Maverick and the East Texas Basins are delineated on figure 9, but the Gulf Coast Basin is shown only on the index map because overall it is interpreted to be a super-province encompassing the entire region

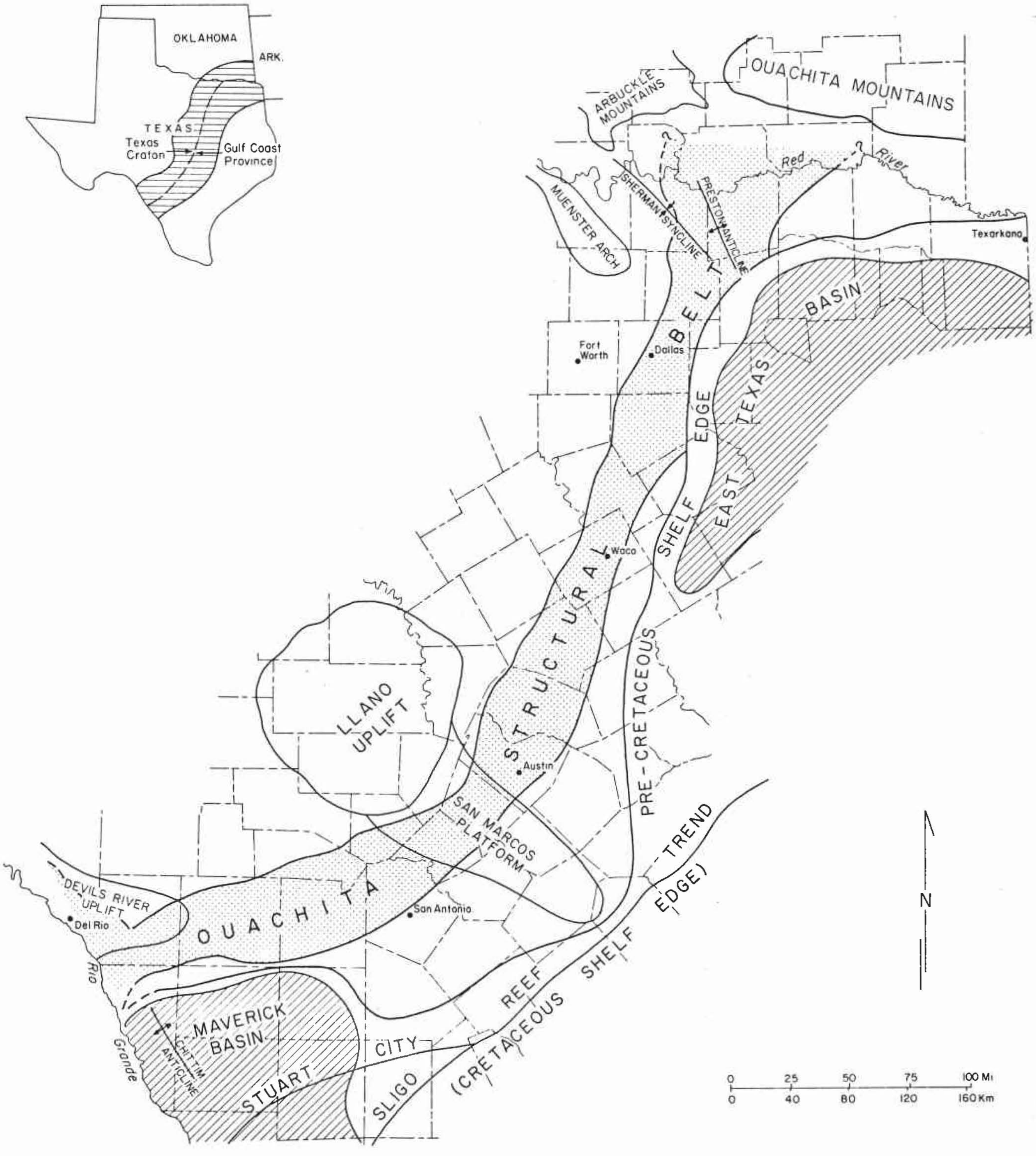


Figure 8. Regional structural elements.

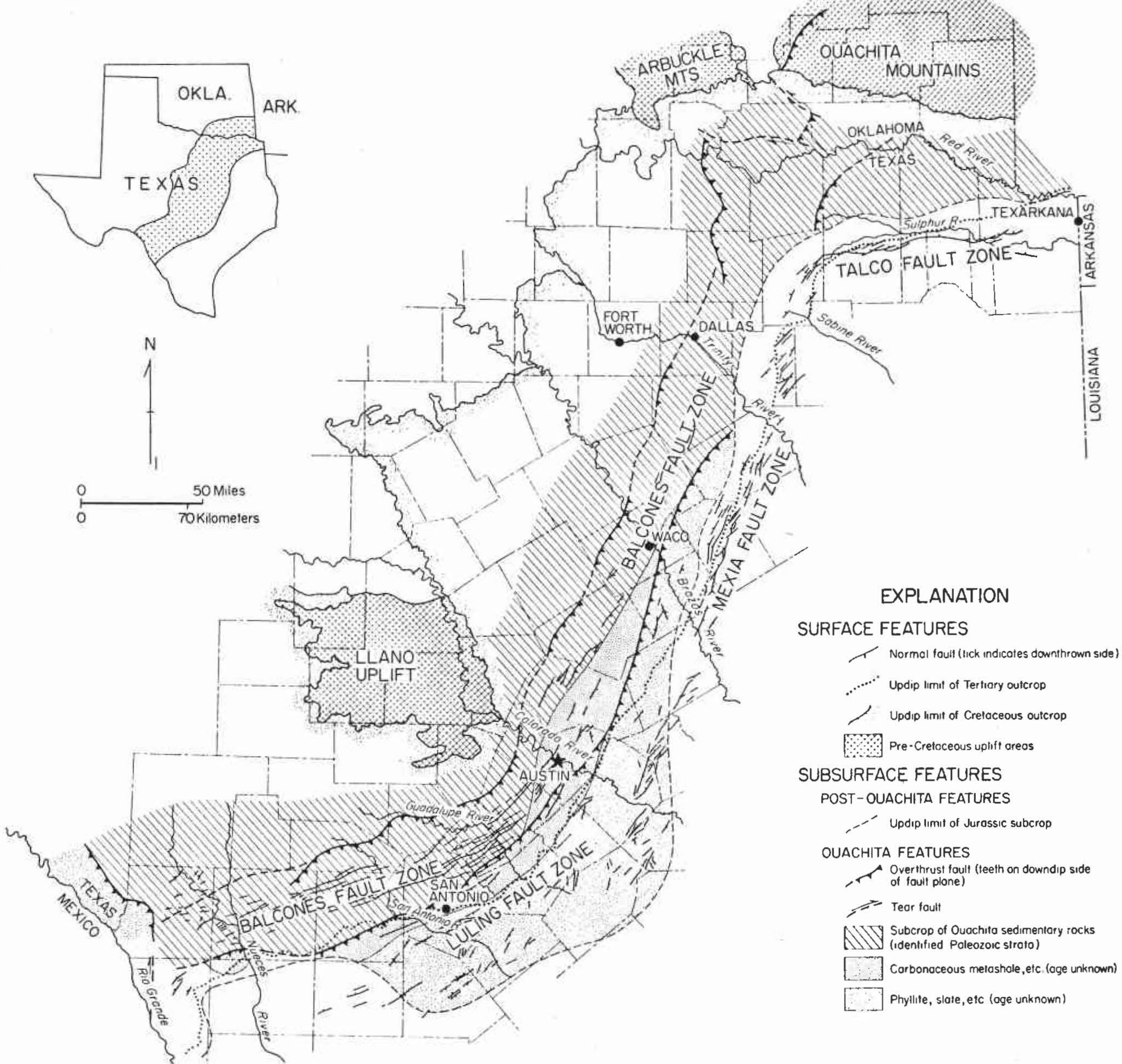


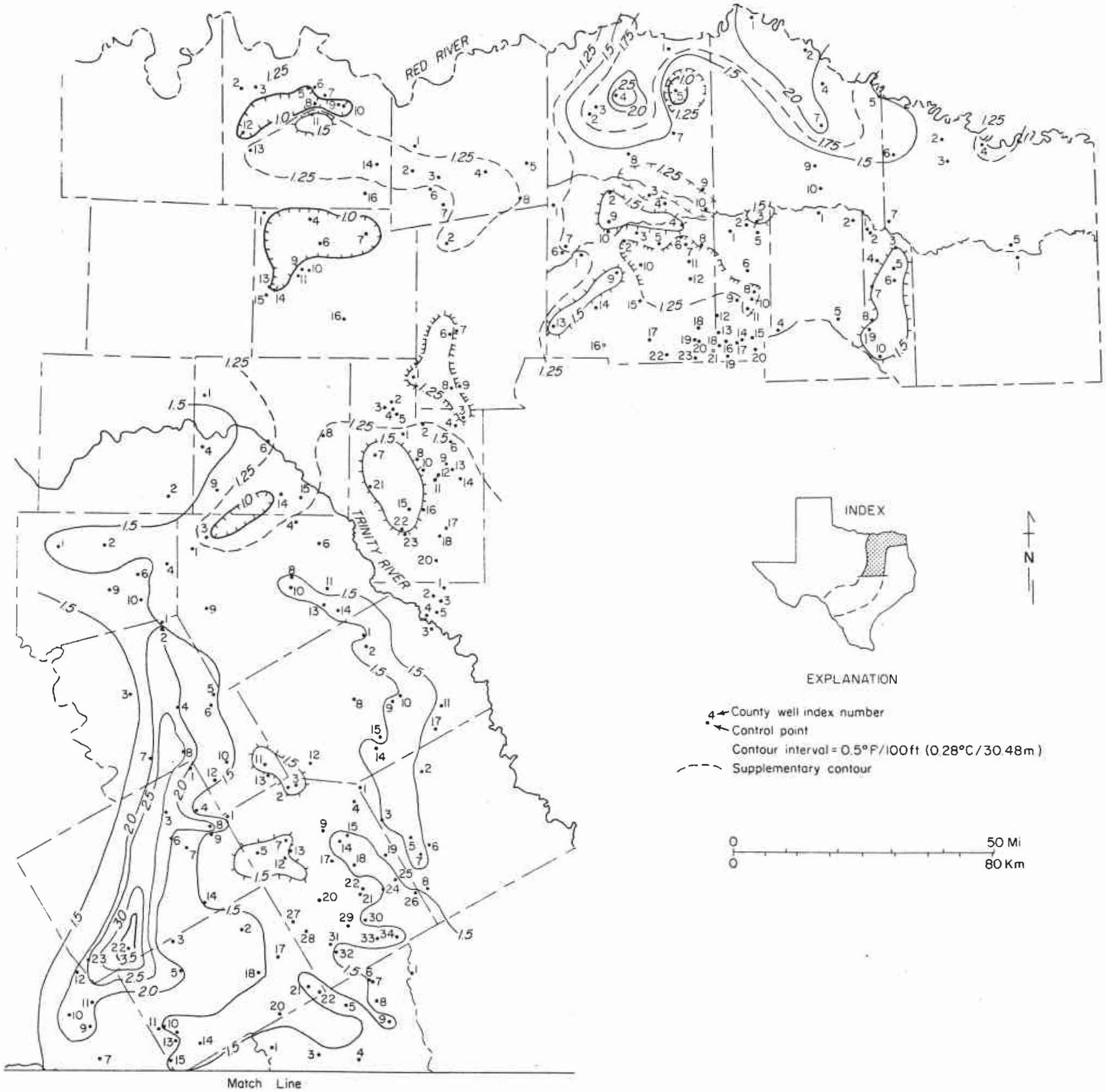
Figure 9. Regional tectonic features (modified from Flawn and others, 1961, and Sellards and Hendricks, 1946).

east of the Texas Craton. An initial boundary might have been the southeastern edge of the Ouachita structural belt. As the basin was filled with sediment during the early Mesozoic, the shelf edge migrated eastward. During deposition of the Edwards Group the shelf edge apparently stabilized along the Stuart City Reef Trend. Later, during the Tertiary and Quaternary periods, the basin continued to regress with only minor transgressions.

The map showing geothermal gradient (fig. 10) reflects some of the regional structural and tectonic features. Most of the gradient values show an increase ranging from 1.0° to 1.5° F for every 100 ft (18° to 27° C/km) of depth. However, there are anomalies with closures of more than 3.0° F/100 ft (55° C/km). These high anomalies lie mostly along the main zones of normal faulting in the Balcones system, which is also superjacent to Ouachita structural belt and its zones of thrust faulting and different degrees of metamorphism (Flawn and others, 1961).

Geothermal anomalies may be due to structural setting or to hydrologic factors. Clearly, there appears to be a relation between the location of faults and the abnormal gradients. This may be due to two divergent mechanisms; the faults may be conduits for upwelling fluids (i.e. hot brines), or the faults might retard fluid flow, thus resulting in a stagnating hydrologic system and a long-term increase in temperature. The local sources of the heat either trapped or conveyed by faults include (1) exothermic chemical reactions among deep-seated fluids, (2) buried plutons that are still cooling, (3) the presence of radiogenic rocks at depth, and (4) zones of rock possessing relatively high thermal conductivity properties. As noted by Plummer and Sargent (1931), these and other factors might act singularly or in concert to contribute to abnormal geothermal gradients in the Gulf Coast region.

It is beyond the scope of this report to address fully the problem of geothermal heat sources. Nevertheless, convergence of high geothermal gradients, locus of faulting, major deep-seated structural elements, and the occurrence of warm groundwaters pose many potientially fruitful lines of inquiry for further study. No doubt a combination of factors has affected the geothermal setting in this study region. The geothermal gradients as reported here are conservative (low) values based on bottom-hole temperatures as recorded on electric logs. These logs are generally run immediately after a well is drilled, yet the bottom-hole temperature is usually mediated by the circulation of drilling muds. A long-term monitoring of thermal conditions in this region might show even greater temperature anomalies.


RED RIVER
TRINITY RIVER
INDEX
N
EXPLANATION
4 ← County well index number
Control point
Contour interval = 0.5°F/100ft (0.28°C/30.48m)
Supplementary contour
0 50 Mi
0 80 Km
Match Line

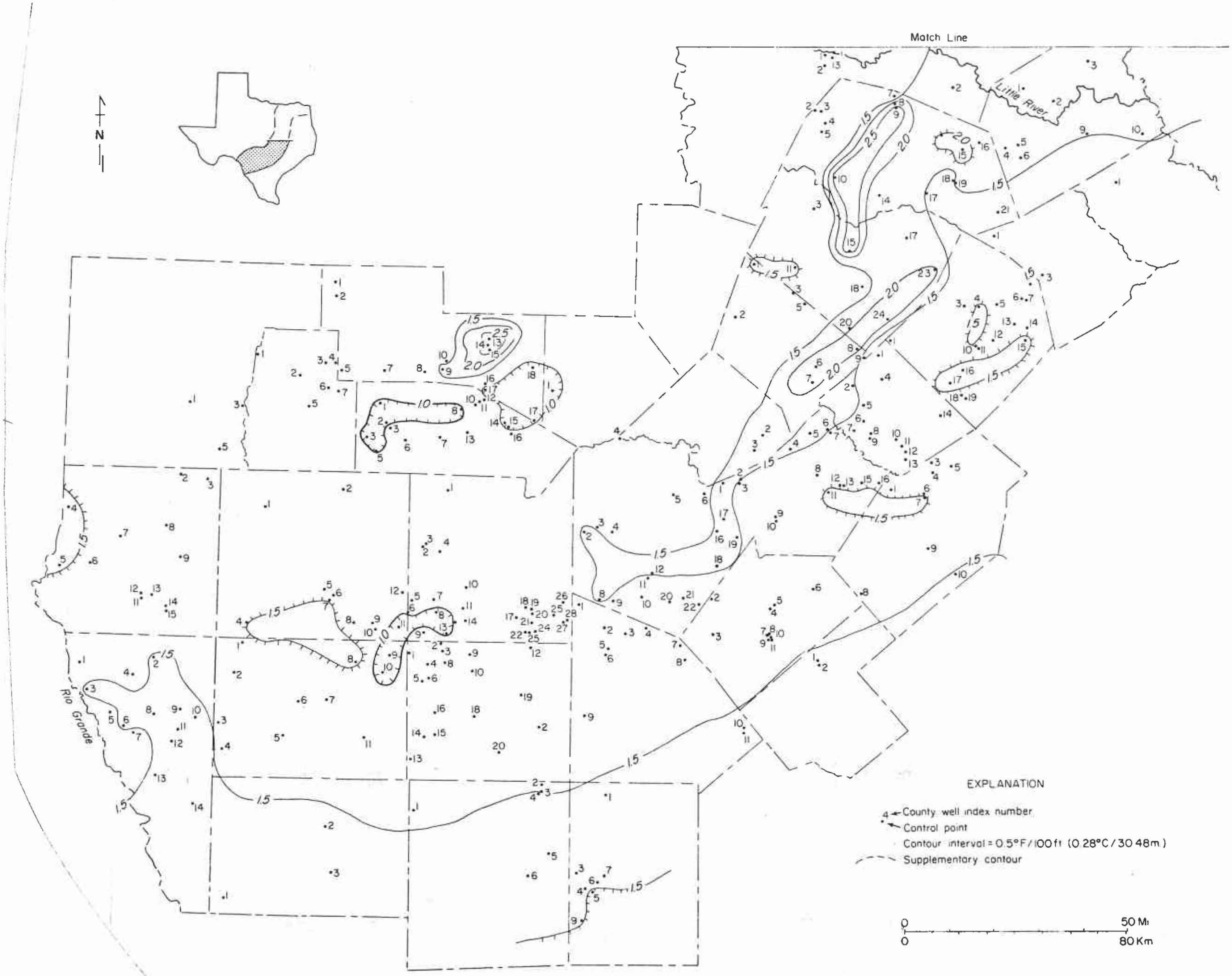


Figure 10. Geothermal gradient of region (on facing pages).

Regional Stratigraphy

The geothermal aquifers are mostly Lower Cretaceous sandstone units that are superjacent to the Ouachita structural belt. Of these, the most notable potential geothermal resource occurs in the basal Cretaceous sands--the strata that rest directly on the Ouachita rocks. However, in South Texas, the Edwards Limestone also yields warm waters, as does the Carrizo Sand of Tertiary (Eocene) age farther east in the Gulf Coast Basin. In northeast Texas, the Upper Cretaceous Woodbine Sand is also a notable source of warm water. The geographic and stratigraphic distribution of the warm-water-bearing rock units indicates that near this structural hinge zone the deepest stratum that maintains hydrologic communication with meteoric waters (and thus is part of a viable aquifer system) exhibits abnormally high temperatures in its downdip reaches. The aquifers apparently serve as a natural heat exchange and heat storage system in response to the anomalous geothermal gradients along the Ouachita-Balcones trend. Because of the functioning of aquifers in this way progressively younger stratigraphic units serve as geothermal water-bearing units from the Texas Craton to the Gulf Coast Basin.

The regional stratigraphic picture is complex, partly because of structural framework and resulting changes in depositional processes across this region, but mostly because of nomenclatural inconsistencies. For example, the basal Cretaceous (Trinity) sands aquifer systems--that is, the initial terrigenous sands that were deposited on the Paleozoic surface--has no less than nine stratigraphic units cited in the literature for sands of (probably) equivalent age and of similar depositional environments. There are nomenclatural changes from outcrop into the subsurface, as noted in Central Texas (fig. 11), and there are nomenclatural changes along strike (fig. 12).

Of the various basal Cretaceous sandstone units, eight of these and their permutations are listed as aquifers in the data files of the Texas Department of Water Resources. For the sake of simplicity, we have considered only three or four of these units. In Central Texas we have focused on the Hosston Sand and the Hensel Sand, thus discriminating these two "members" from what has previously been termed the Travis Peak Formation (Klemt and others, 1975). Farther north, near the Trinity River, we have combined Travis Peak, Trinity, Twin Mountains, Antlers, and the updip part of the Paluxy all under the rubric "Trinity Sands Undifferentiated." Hence, we consider only six units region-wide: the Hosston, the Hensel, the Trinity Undifferentiated, the Paluxy, the Woodbine Sands, and the Edwards Limestone. Of these, the most important in terms of geothermal potential are three major aquifer systems:

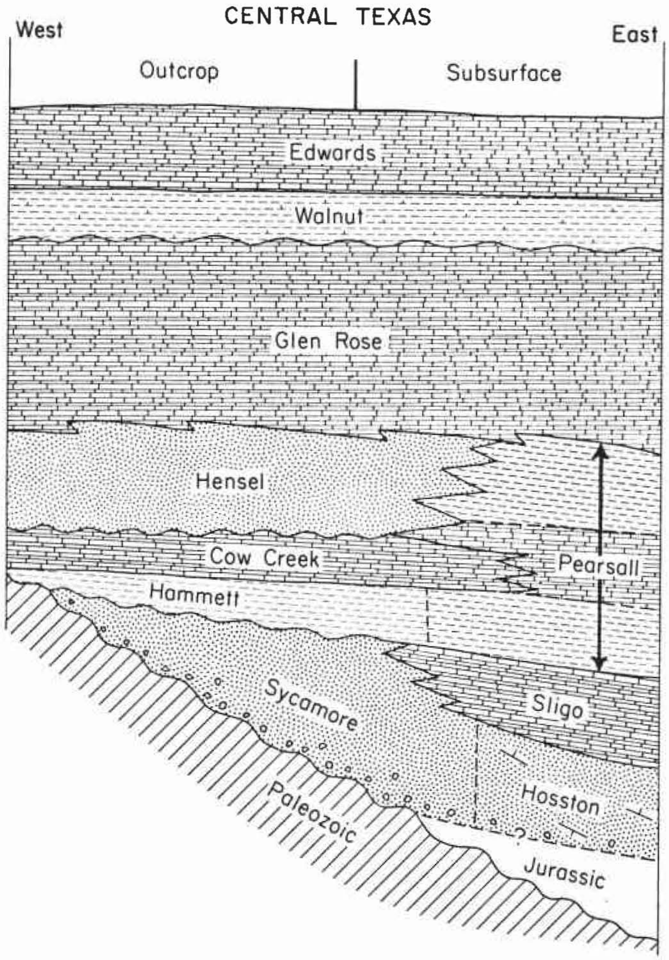


Figure 11. Schematic dip section showing facies and nomenclatural changes of selected Cretaceous units in Central Texas.

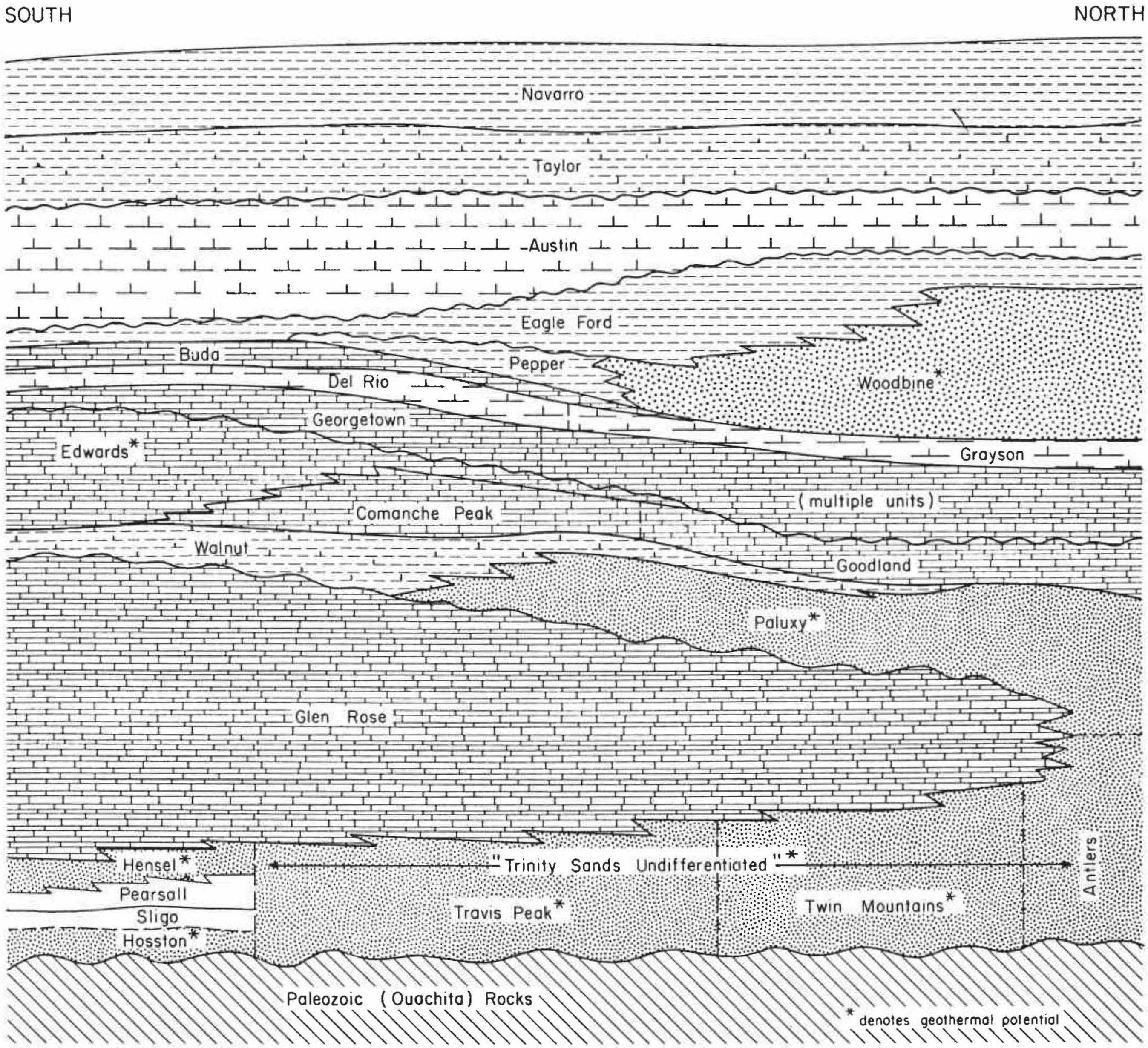


Figure 12. Schematic strike section showing facies and nomenclatural changes of Cretaceous units from Central Texas to North-Central Texas (modified from Fisher and Rodda, 1967).

(1) the Hosston/Trinity Undifferentiated, (2) the Paluxy, and (3) the Woodbine. Outcrop patterns of these units show the geographic distribution of their recharge zone (fig. 13); their configuration at depth is shown on both subsurface geologic maps and cross sections. The series of cross sections (figs. 14-47) shows the geographic location and thickness of rock units that are considered as potential geothermal aquifers; these sections extend beyond the areas in which the strata are tapped as aquifers, so that many downdip and lateral facies changes that limit aquifer capabilities may be seen on the electric log signatures.

Two typical electric logs--one from Travis County and one from Dallas County-- illustrate actual lithic variations from south to north (fig. 48) and provide a basis for recognizing diagnostic log signatures for use of the cross sections presented here. Marked changes also occur in a downdip direction; downdip changes generally militate against aquifer capability at depth owing to either adverse water quality or insufficient well yield. Furthermore, in many instances facies boundaries result in extreme changes in lithic properties of an aquifer host rock. This happens where the Hensel Sand changes downdip into the shales and limestones of the Pearsall Formation in south-central Texas (Loucks, 1977). Such changes result from different environments of deposition--a dip-oriented terrigenous sand system for the Hensel, a strike-oriented carbonate marine shelf system for the Pearsall. Similar changes from a dip-oriented terrigenous sand to a strike-oriented carbonate sand (Bebout, 1977) cause the Hosston Sand to terminate as a viable aquifer in many of its downdip reaches.

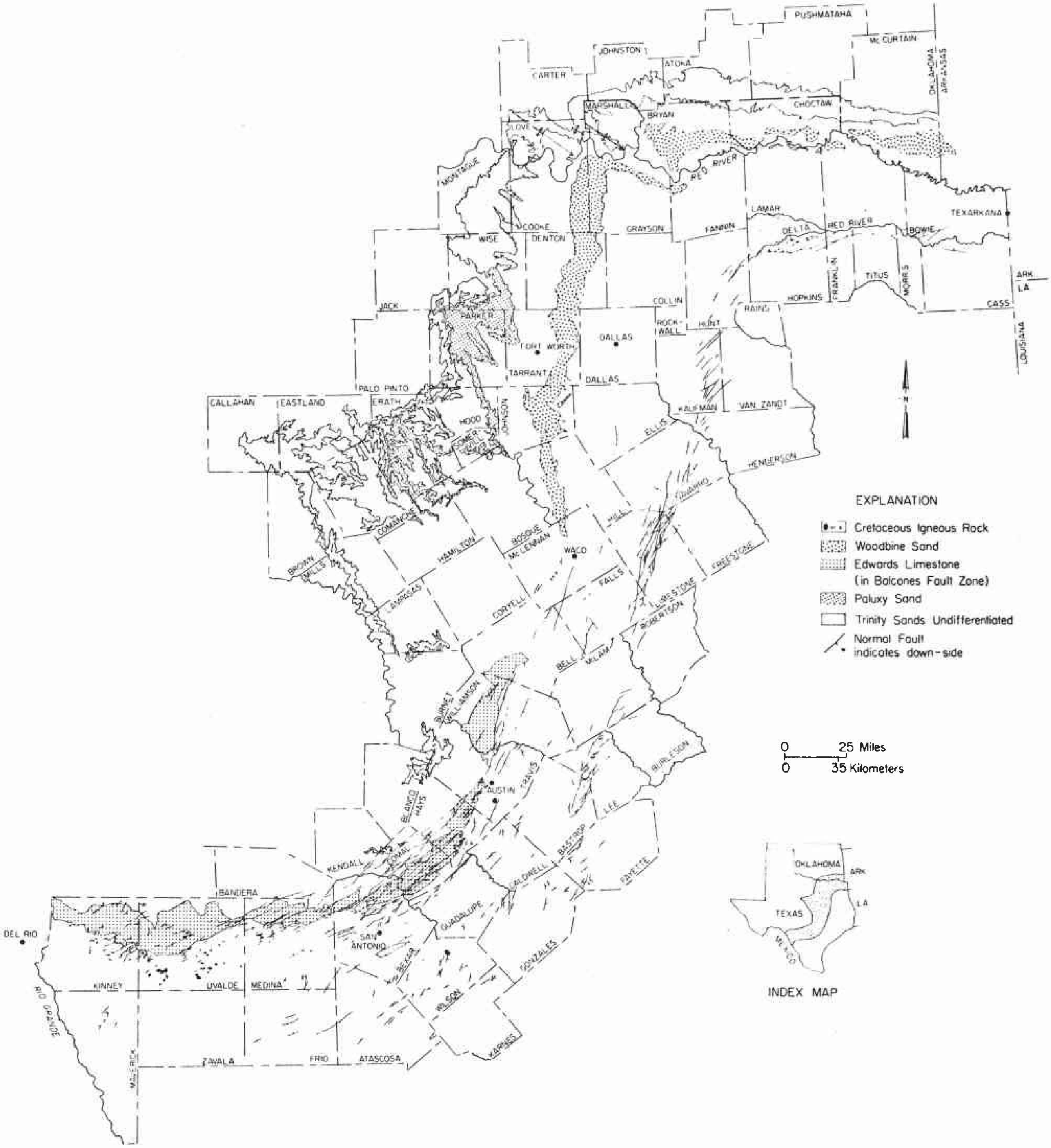


Figure 13. Map showing outcrop of warm-water-bearing Cretaceous strata with respect to Balcones and Luling-Mexia-Talco Fault Zones.

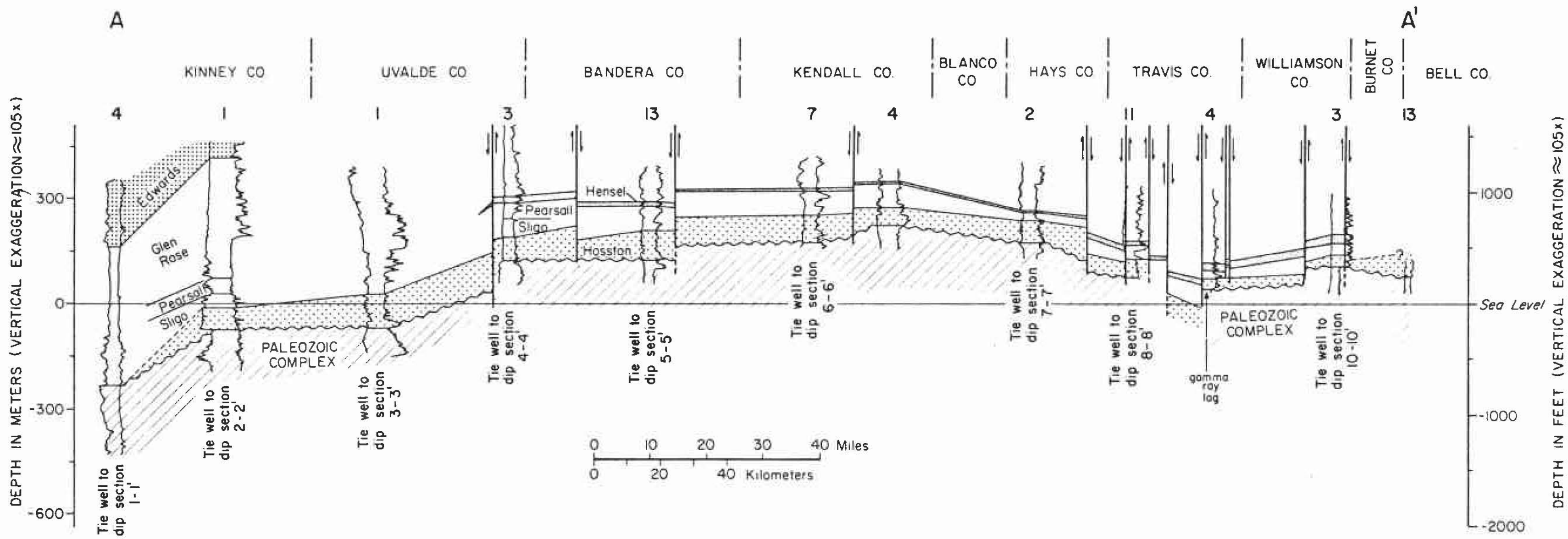


Figure 14. Strike-oriented cross section A-A' (see figure 4 for location; see appendix for individual well data).

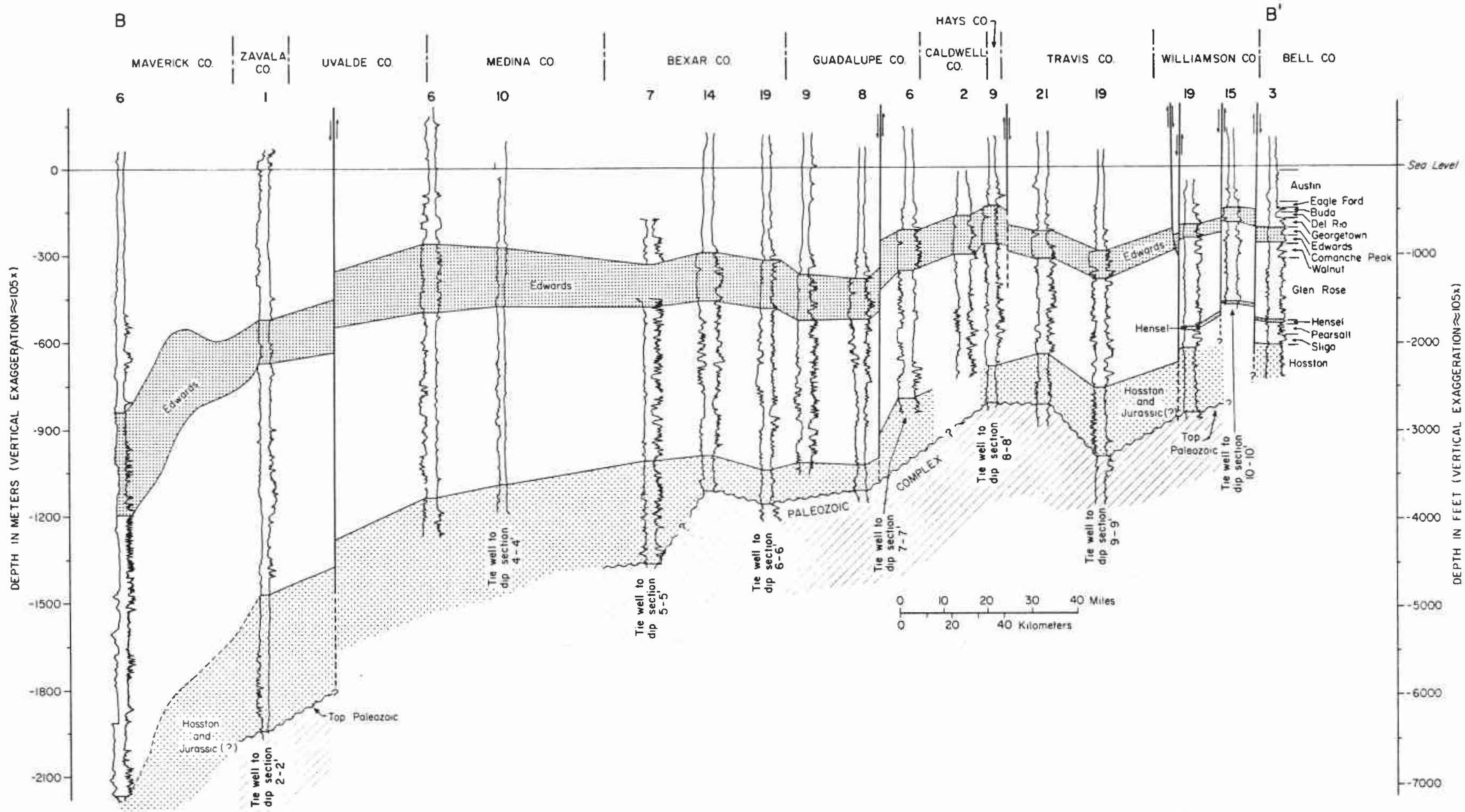


Figure 15. Strike-oriented cross section B-B' (see figure 4 for location; see appendix for individual well data).

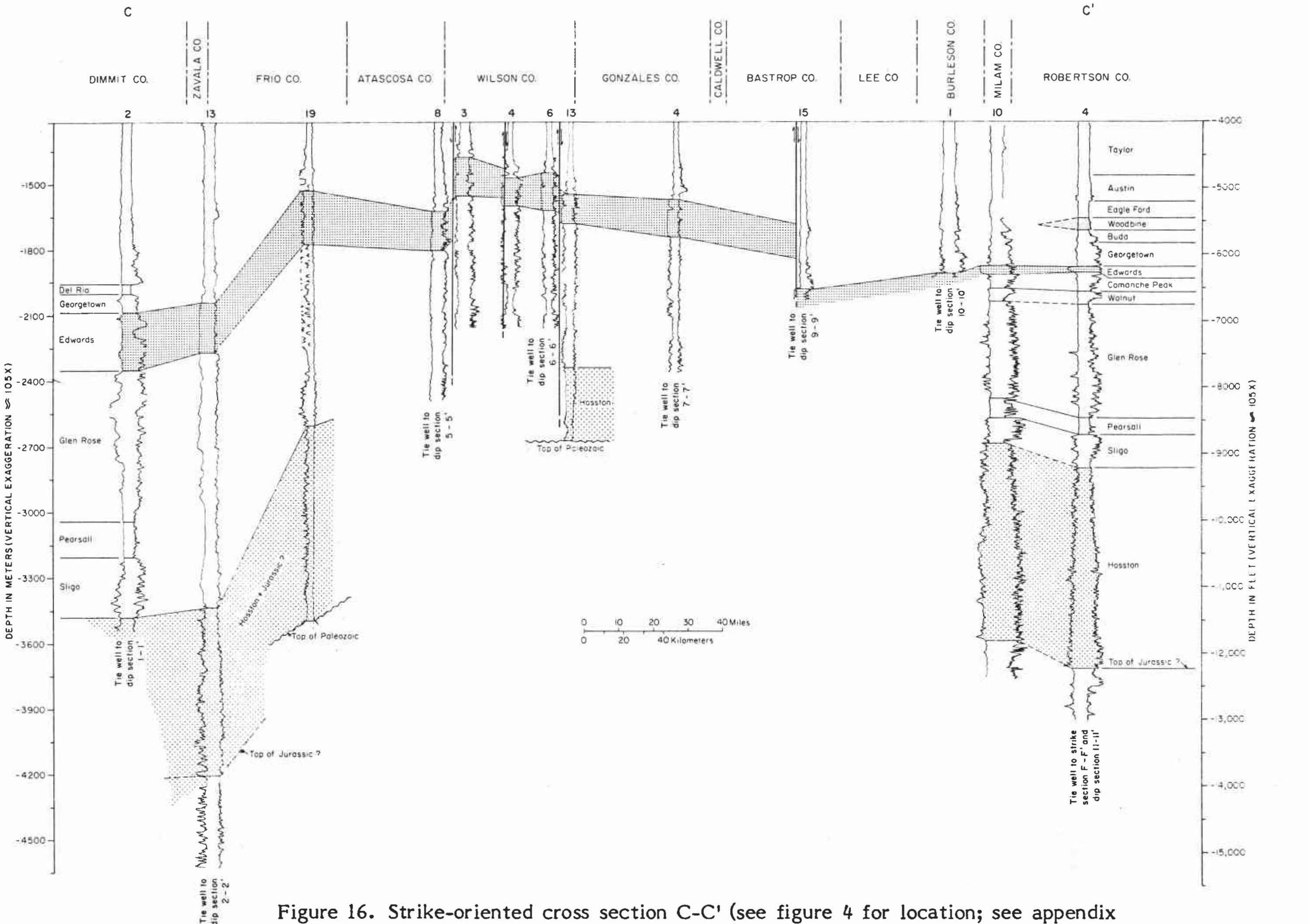


Figure 16. Strike-oriented cross section C-C' (see figure 4 for location; see appendix for individual well data).

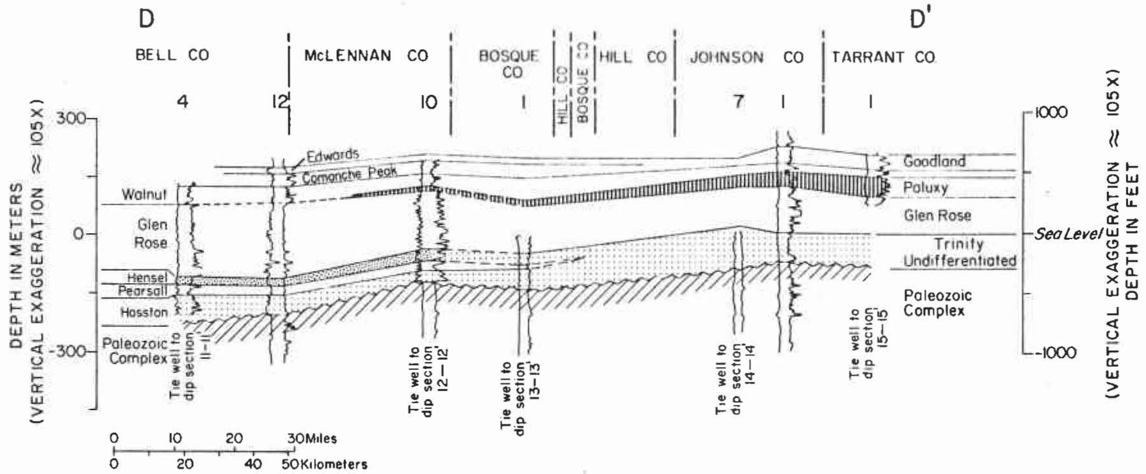


Figure 17. Strike-oriented cross section D-D' (see figure 4 for location; see appendix for individual well data).

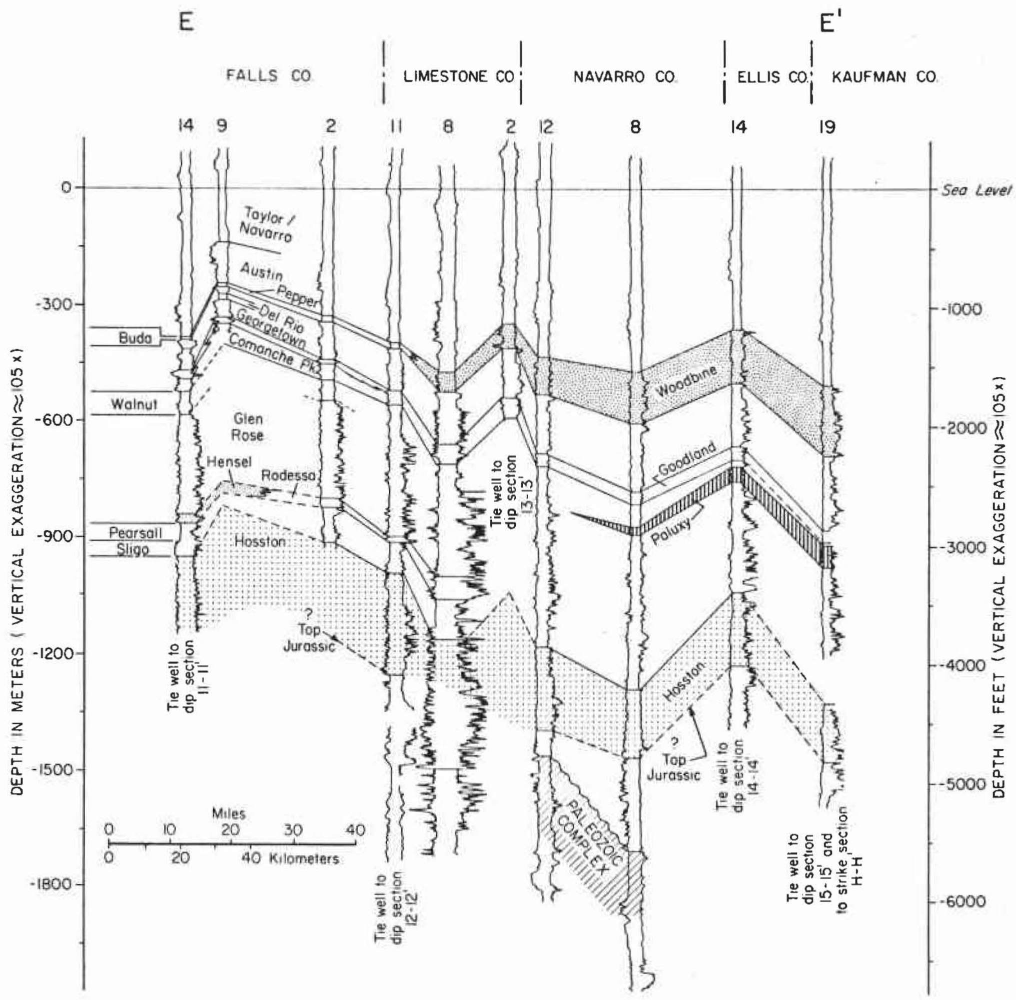


Figure 18. Strike-oriented cross section E-E' (see figure 4 for location; see appendix for individual well data).

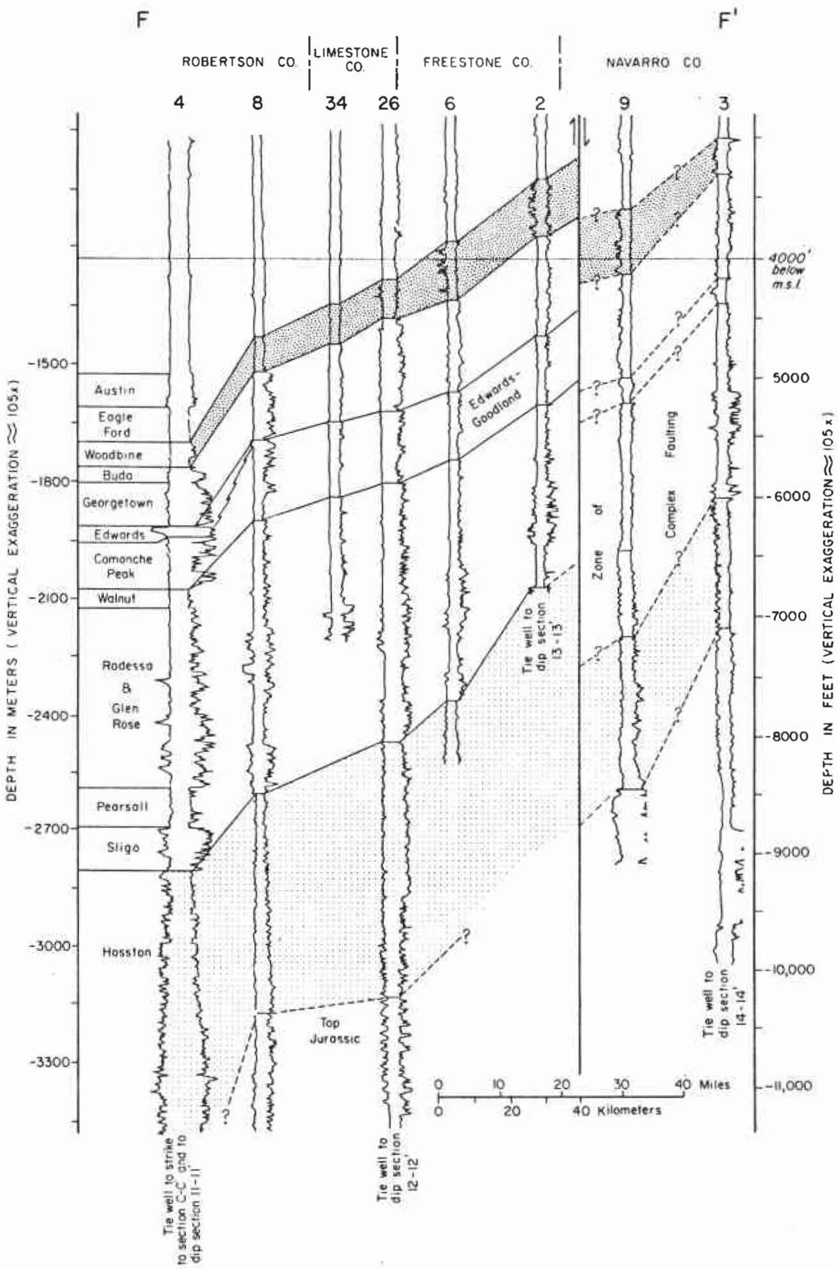


Figure 19. Strike-oriented cross section F-F' (see figure 4 for location; see appendix for individual well data).

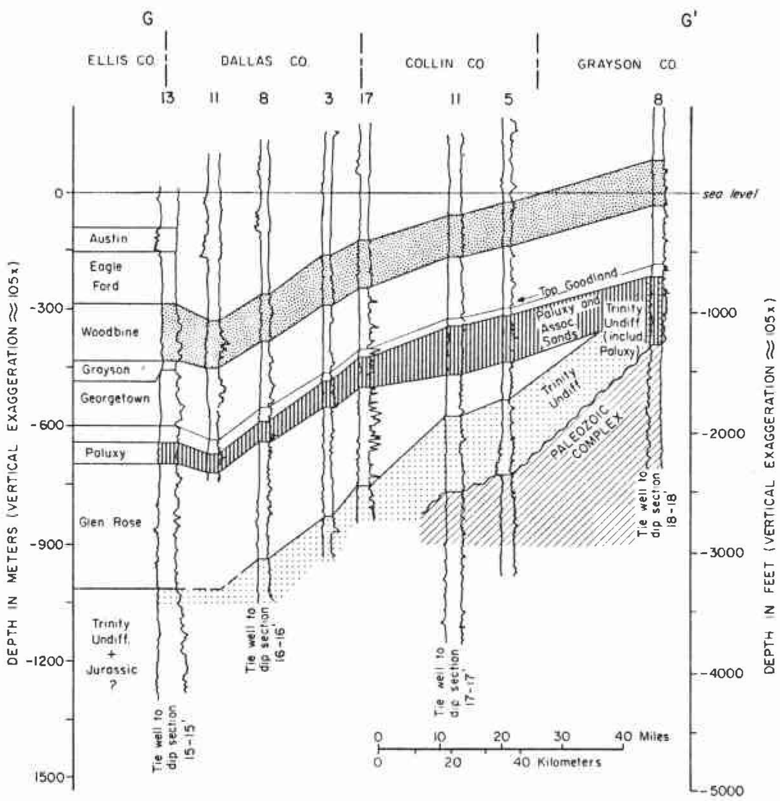


Figure 20. Strike-oriented cross section G-G' (see figure 4 for location; see appendix for individual well data).

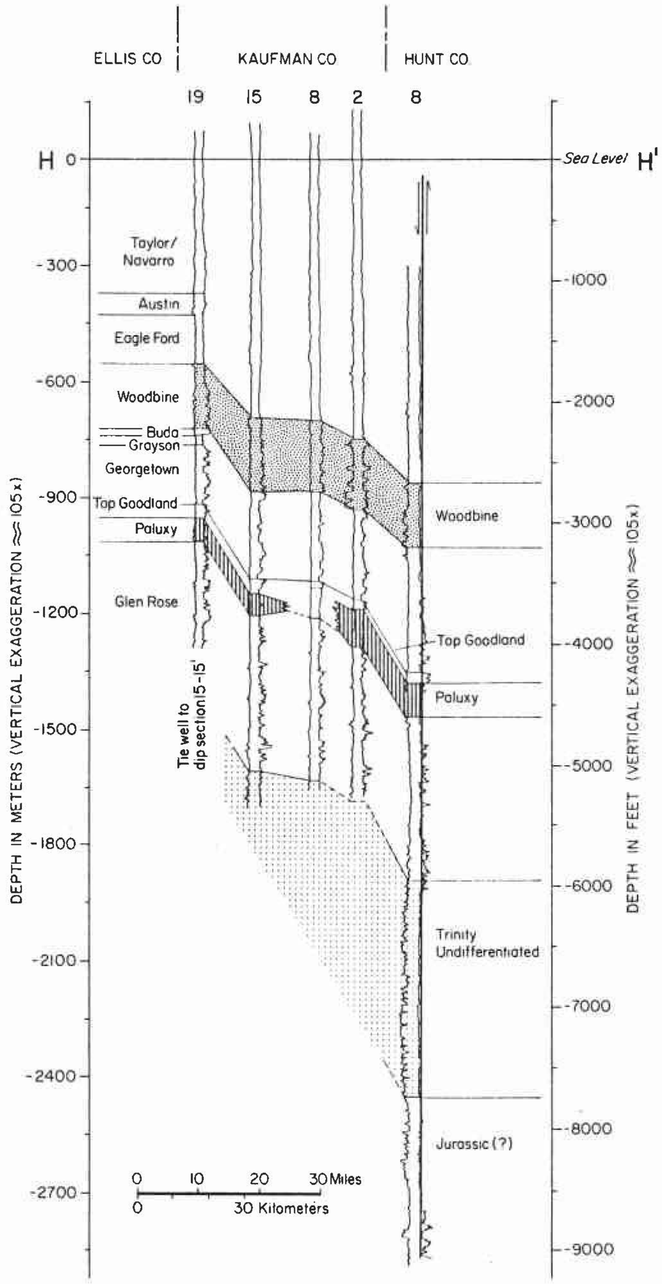


Figure 21. Strike-oriented cross section H-H' (see figure 4 for location; see appendix for individual well data).

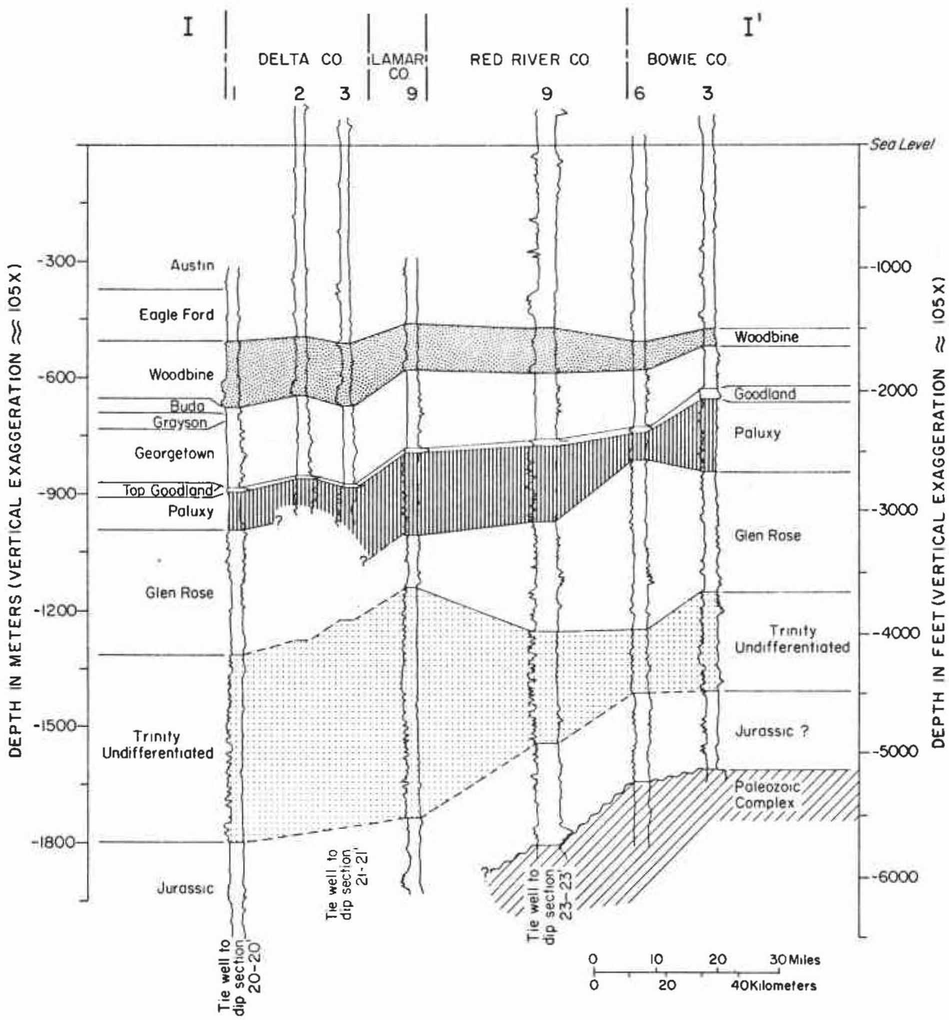


Figure 22. Strike-oriented cross section I-I' (see figure 4 for location; see appendix for individual well data).

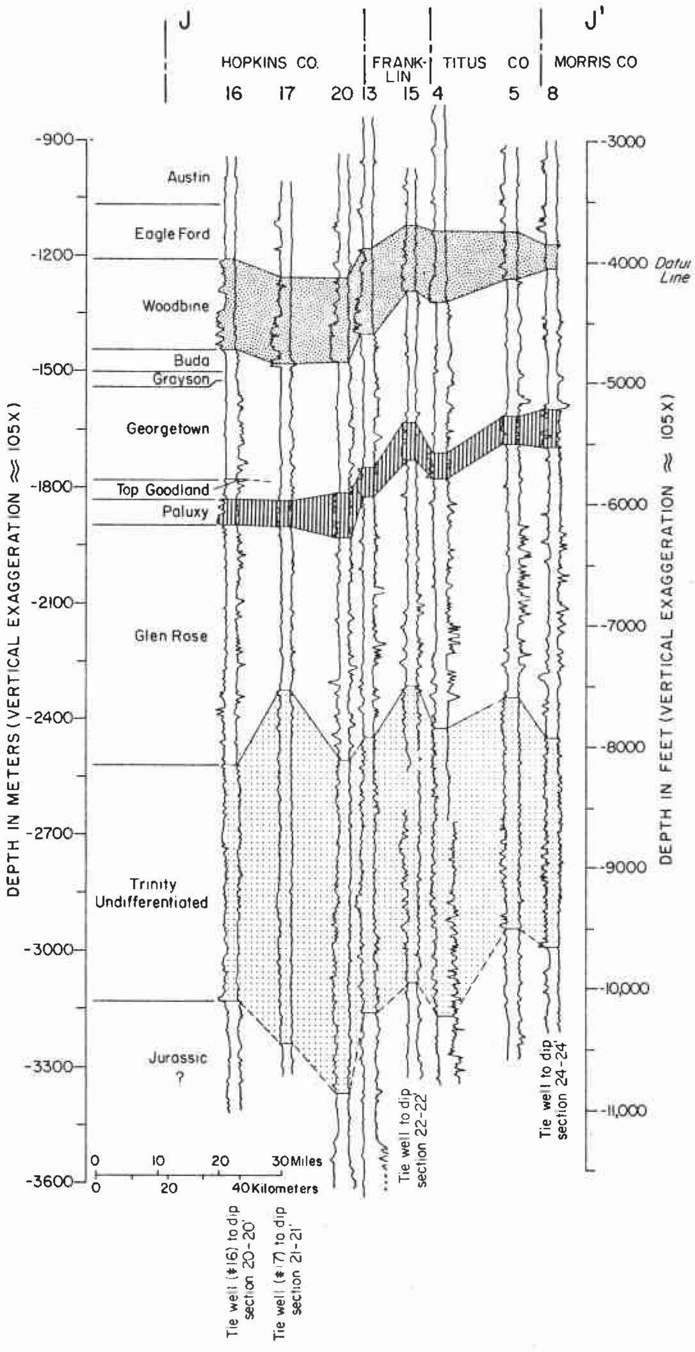


Figure 23. Strike-oriented cross section J-J' (see figure 4 for location; see appendix for individual well data).

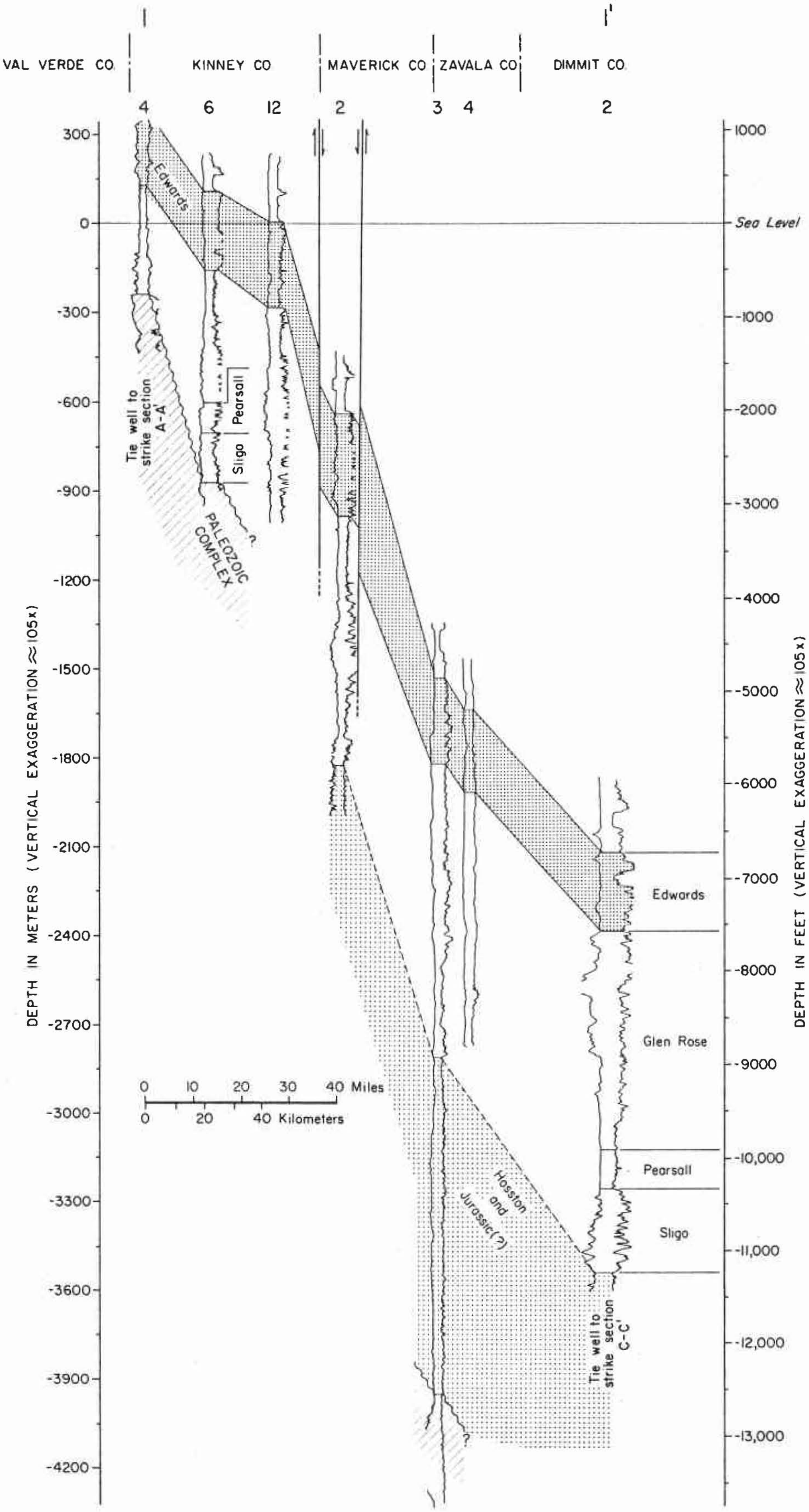


Figure 24. Dip-oriented cross section 1-1' (see figure 4 for location; see appendix for individual well data).

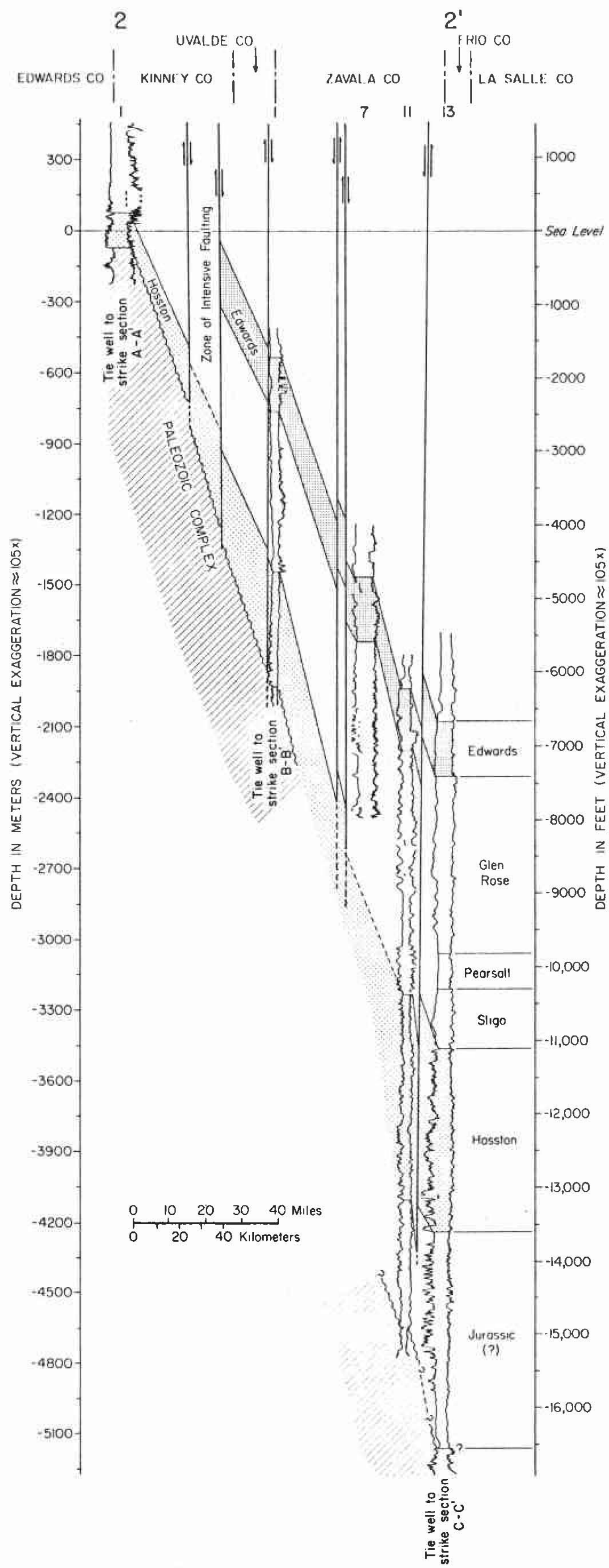


Figure 25. Dip-oriented cross section 2-2' (see figure 4 for location; see appendix for individual well data).

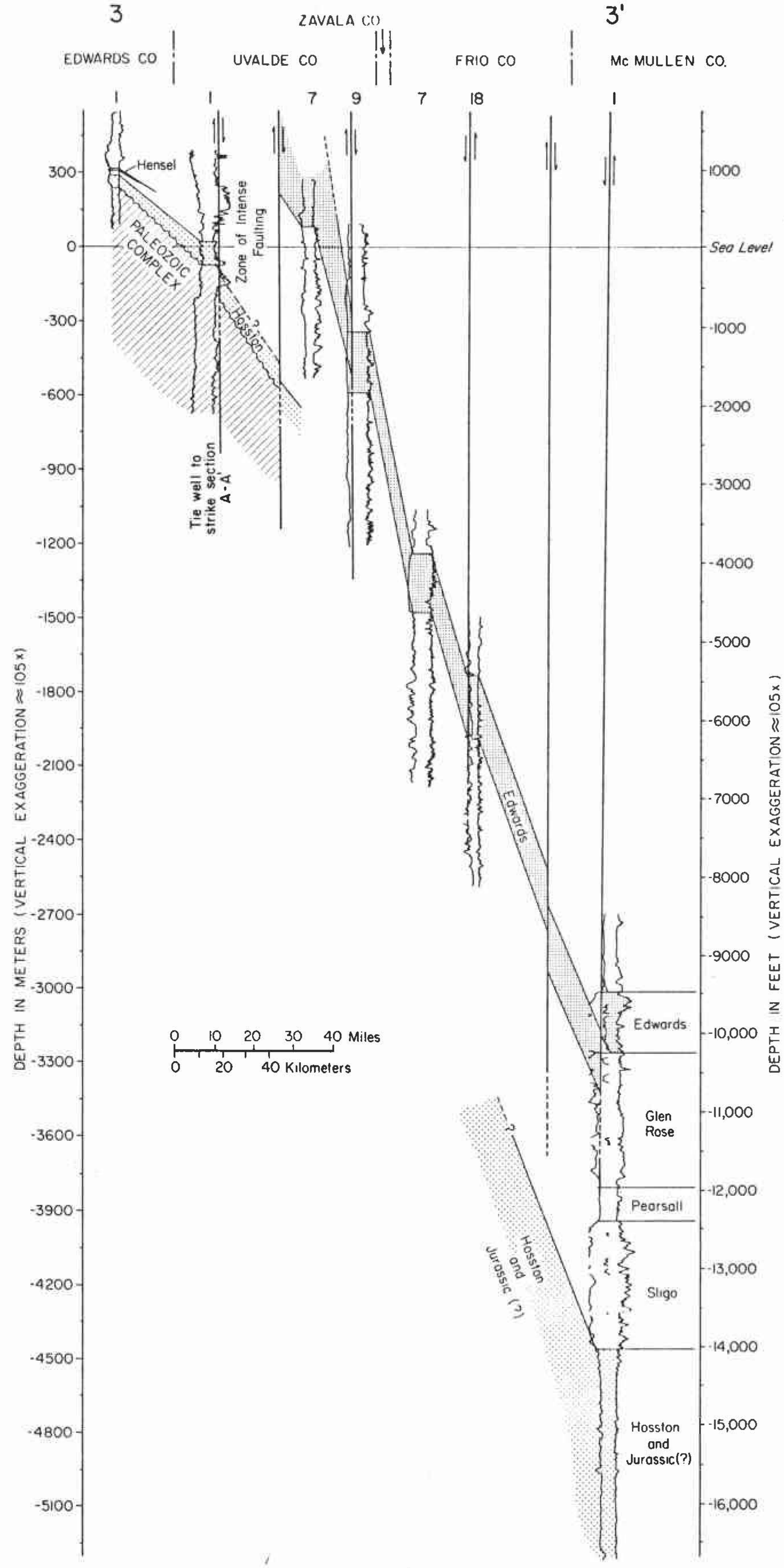


Figure 26. Dip-oriented cross section 3-3' (see figure 4 for location; see appendix for individual well data).

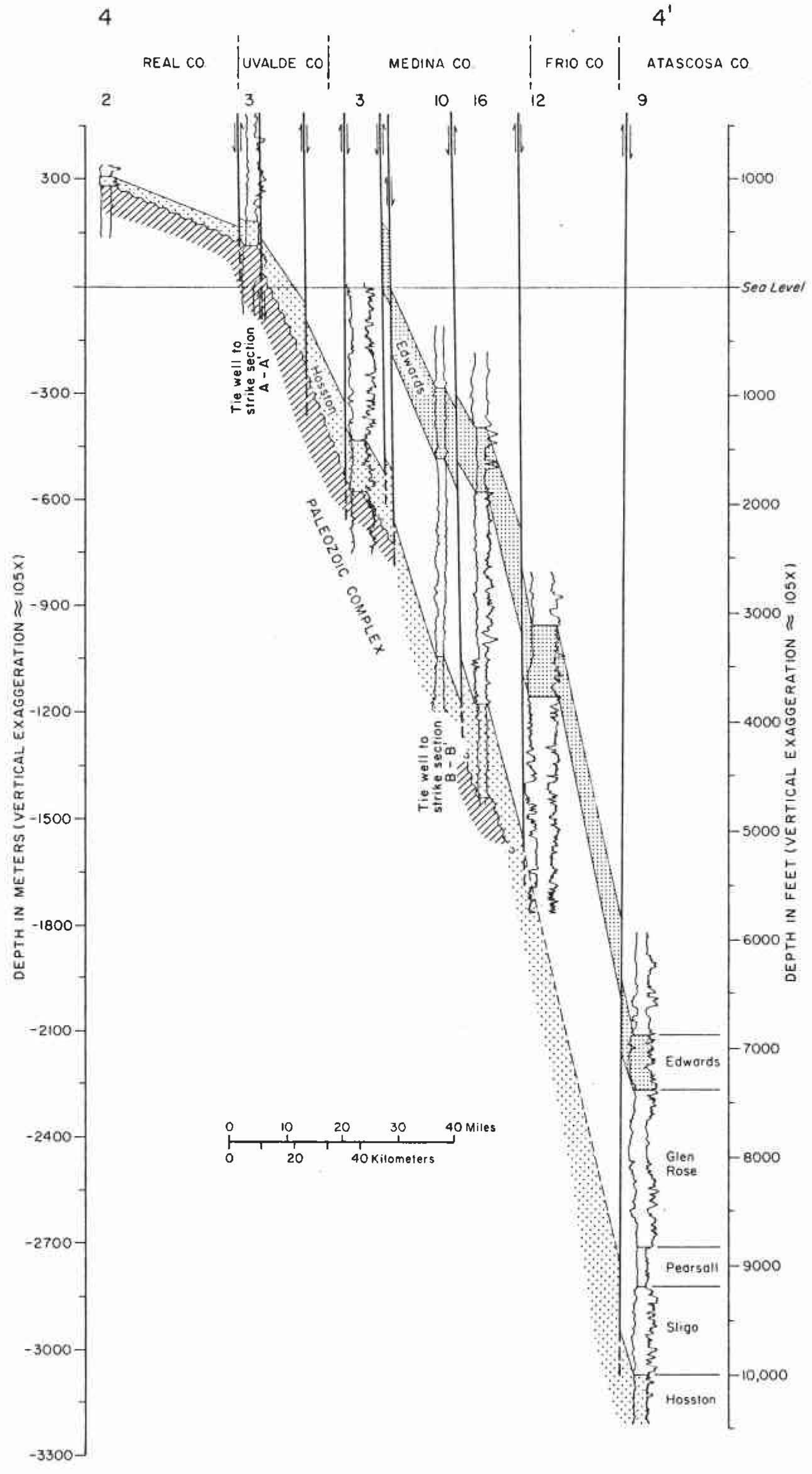


Figure 27. Dip-oriented cross section 4-4' (see figure 4 for location; see appendix for individual well data).

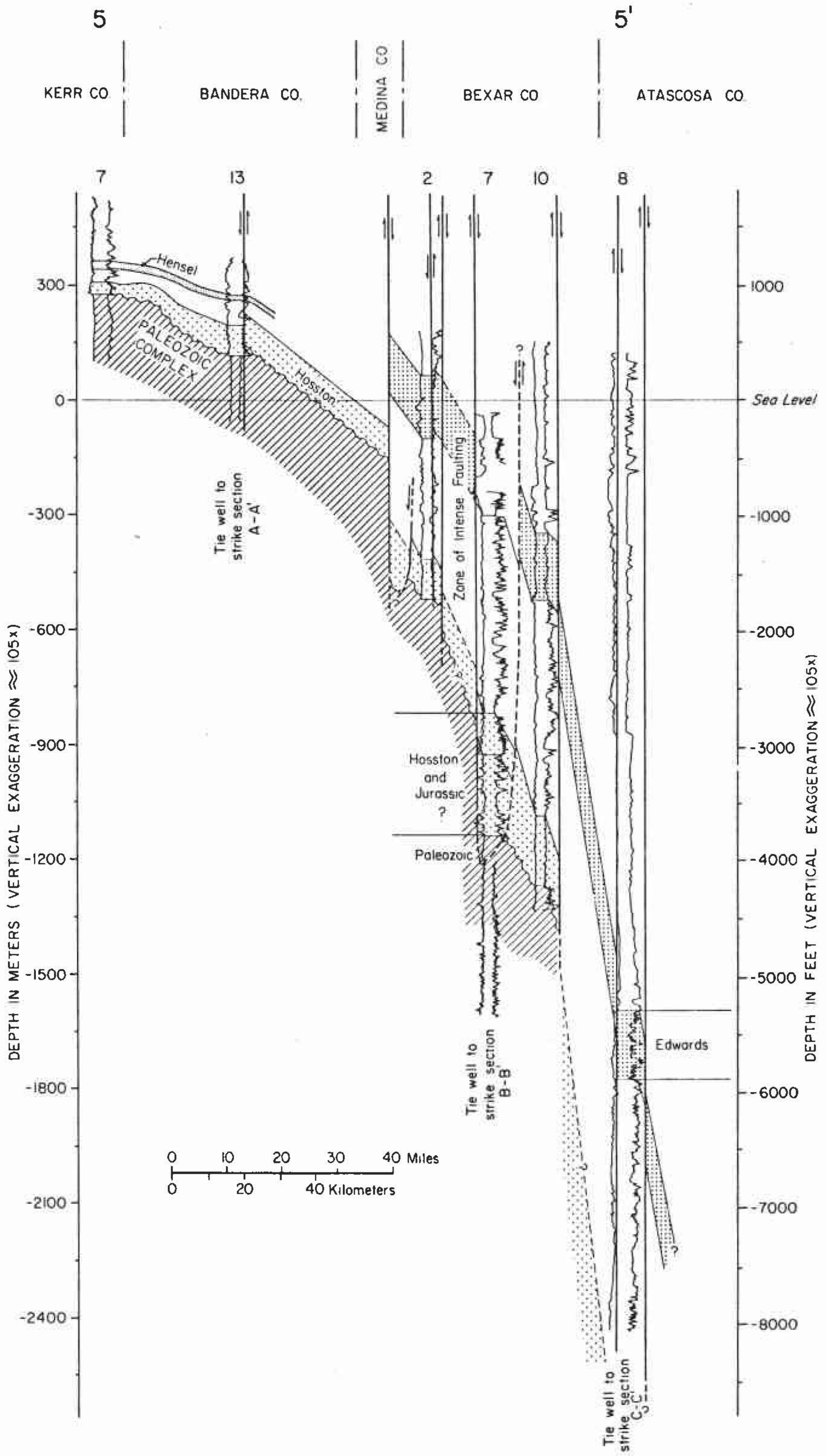


Figure 28. Dip-oriented cross section 5-5' (see figure 4 for location; see appendix for individual well data).

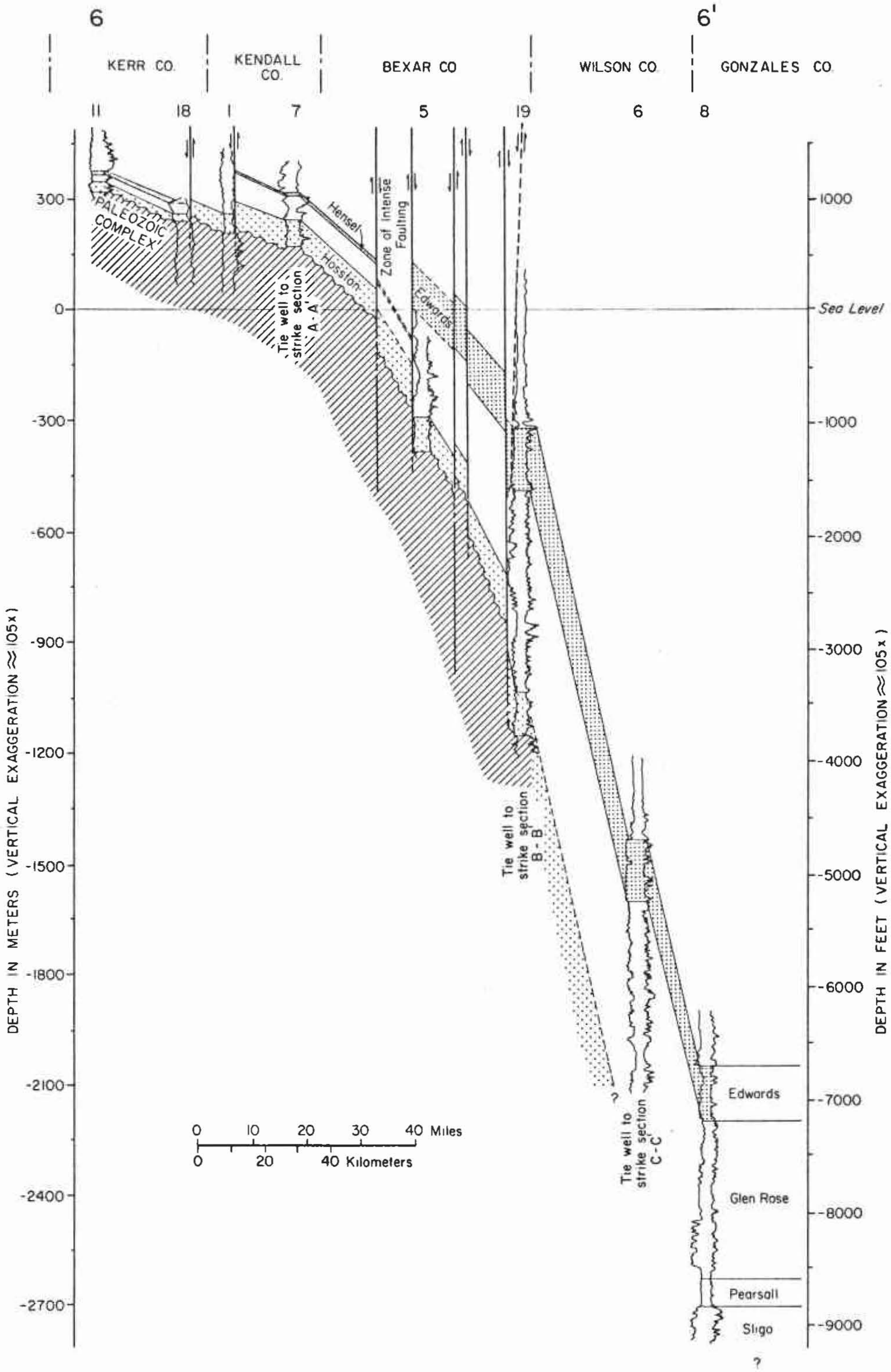


Figure 29. Dip-oriented cross section 6-6' (see figure 4 for location; see appendix for individual well data).

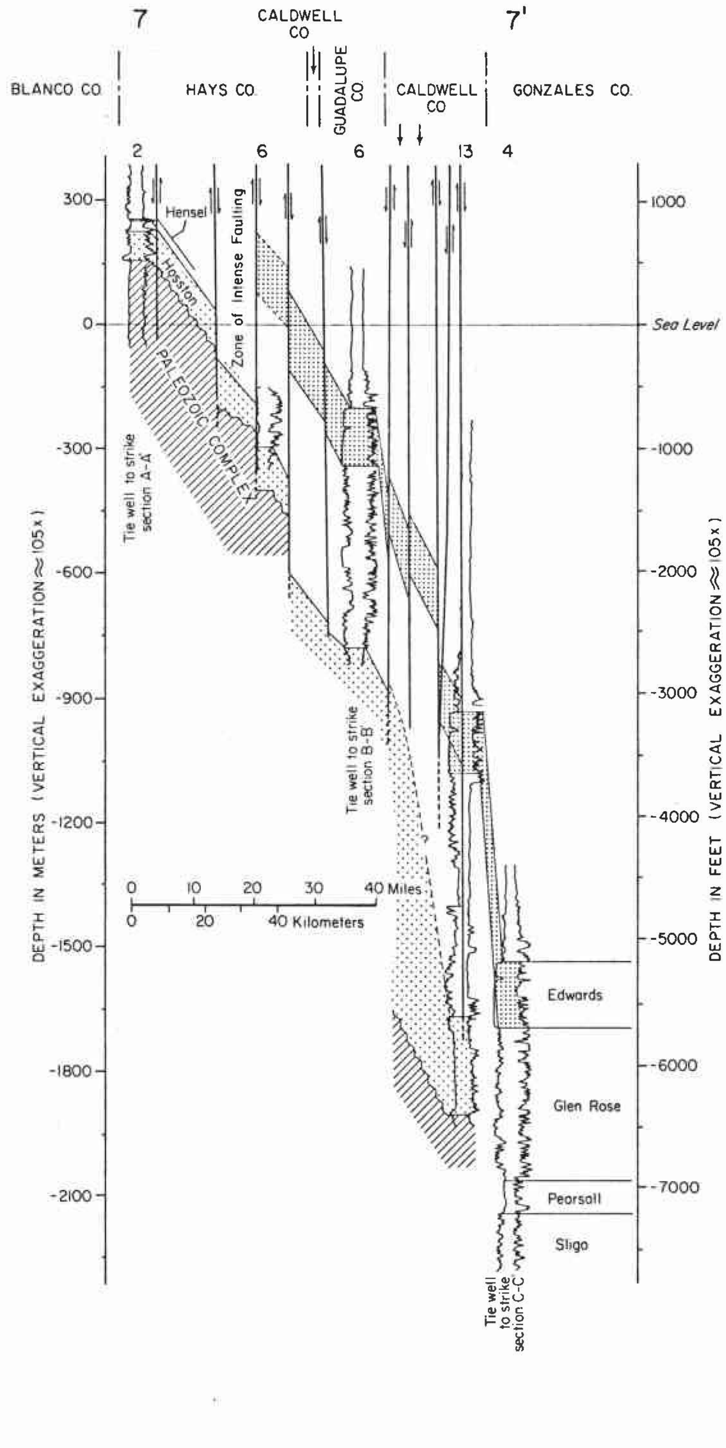


Figure 30. Dip-oriented cross section 7-7' (see figure 4 for location; see appendix for individual well data).

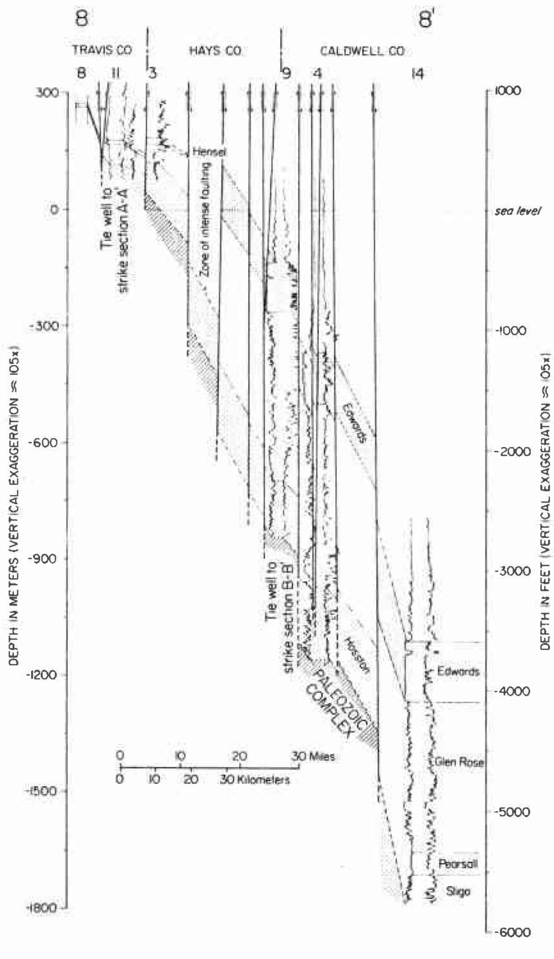


Figure 31. Dip-oriented cross section 8-8' (see figure 4 for location; see appendix for individual well data).

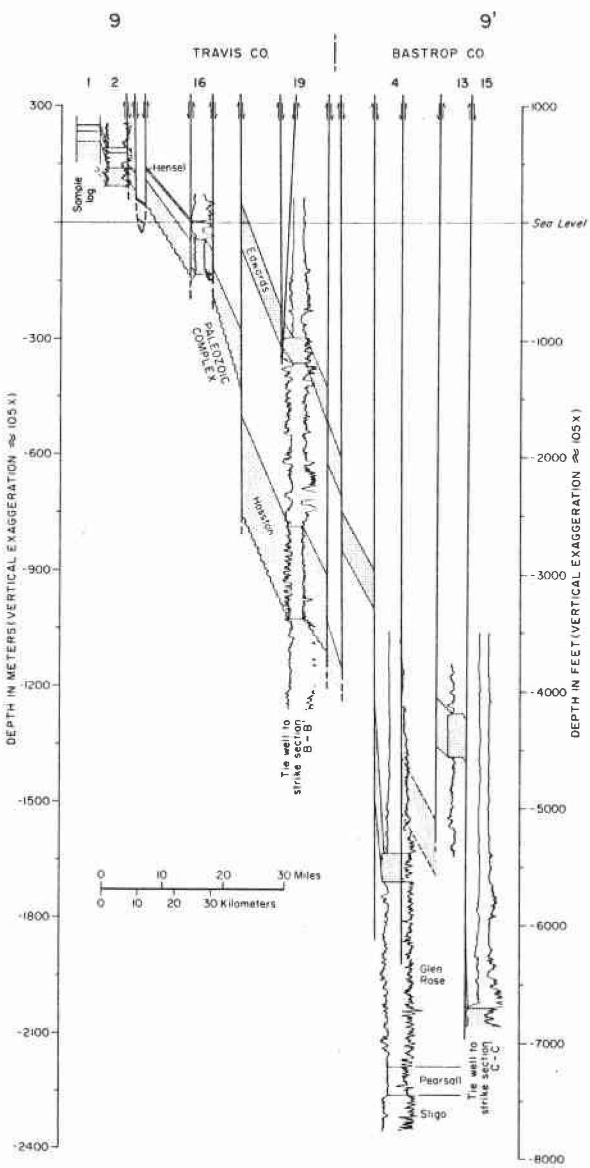


Figure 32. Dip-oriented cross section 9-9' (see figure 4 for location; see appendix for individual well data).

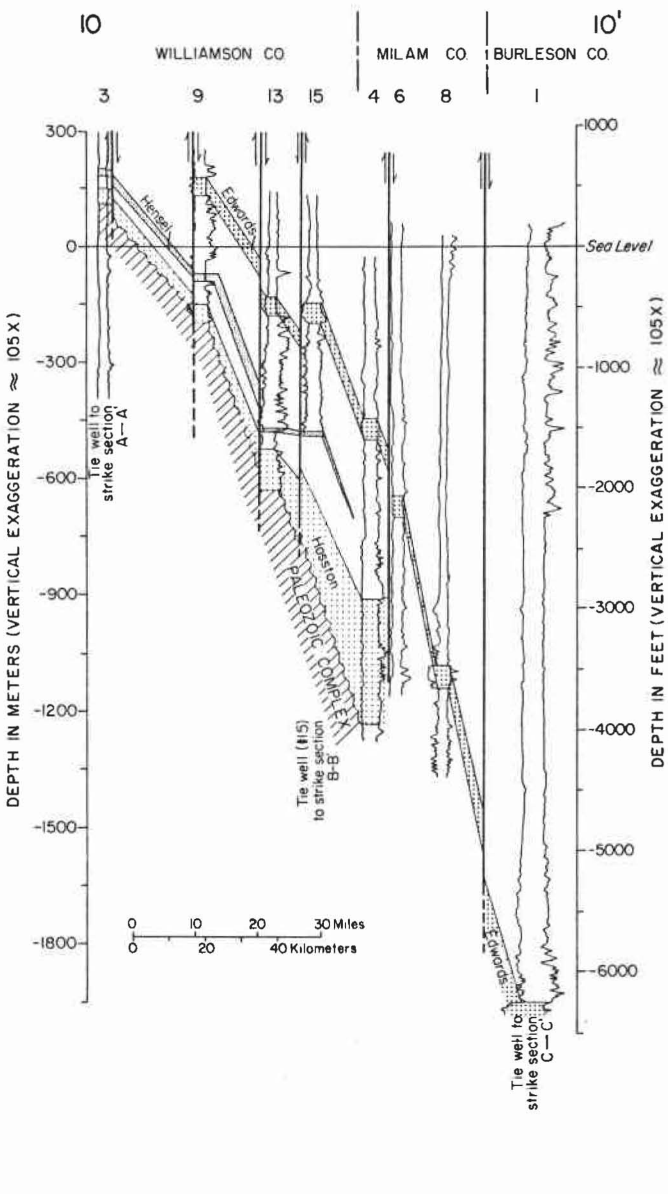


Figure 33. Dip-oriented cross section 10-10' (see figure 4 for location; see appendix for individual well data).

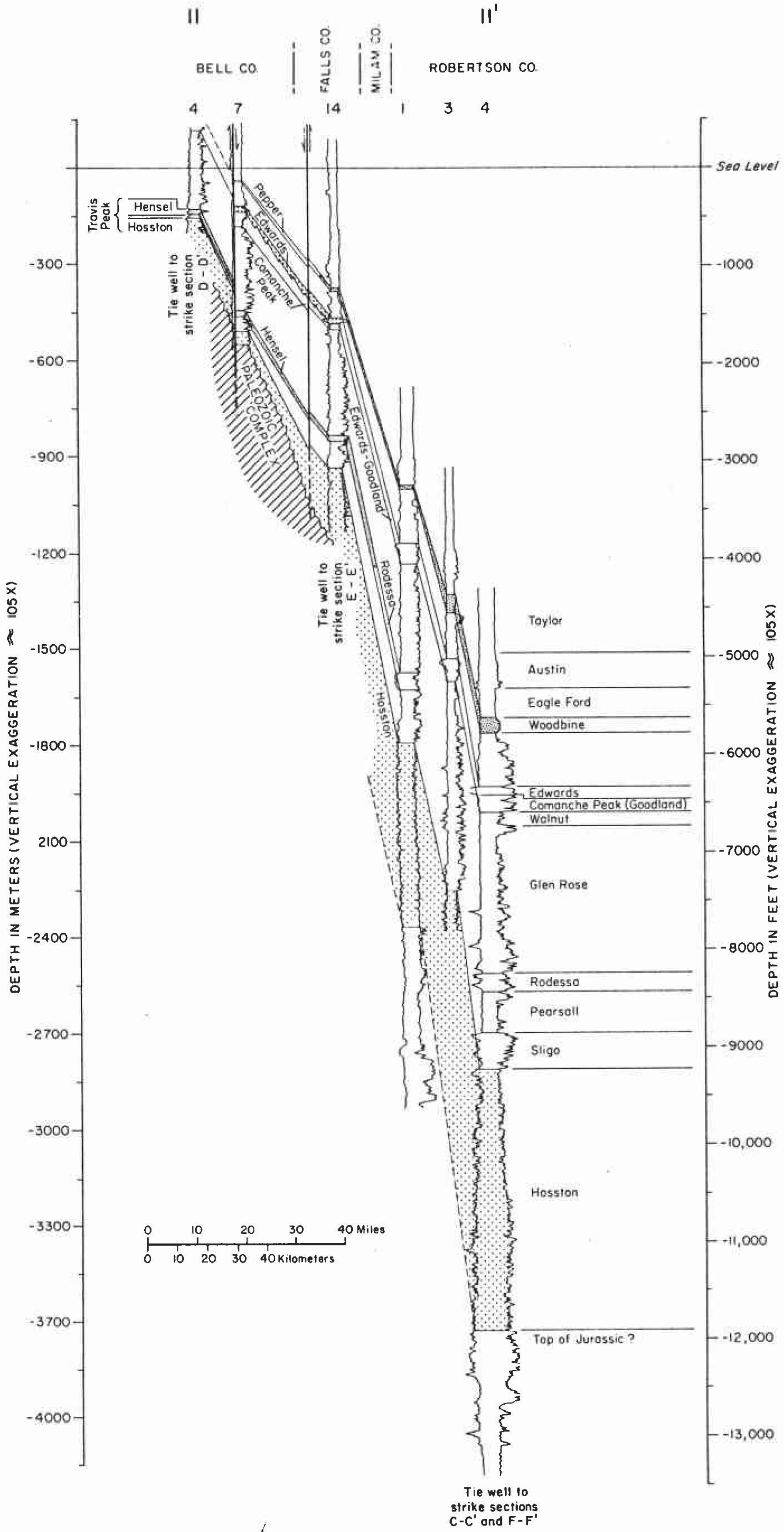


Figure 34. Dip-oriented cross section 11-11' (see figure 4 for location; see appendix for individual well data).

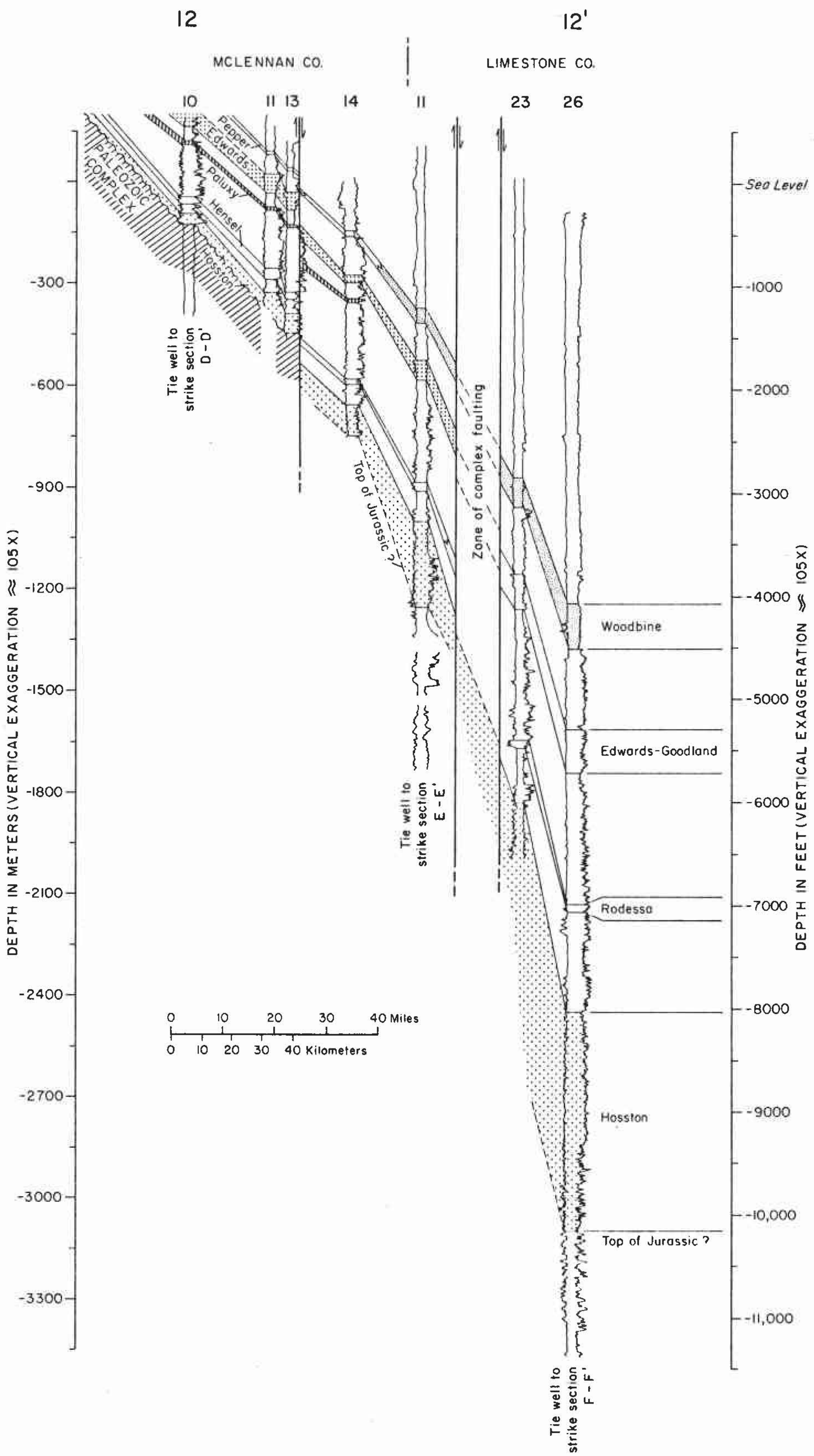


Figure 35. Dip-oriented cross section 12-12' (see figure 4 for location; see appendix for individual well data).

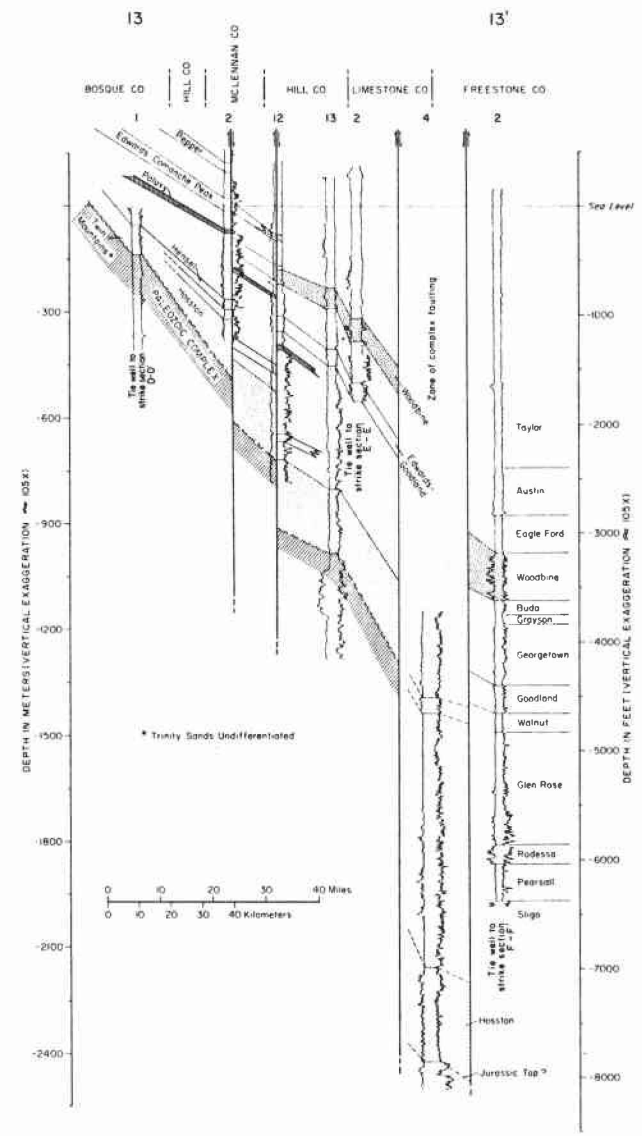


Figure 36. Dip-oriented cross section 13-13' (see figure 4 for location; see appendix for individual well data).

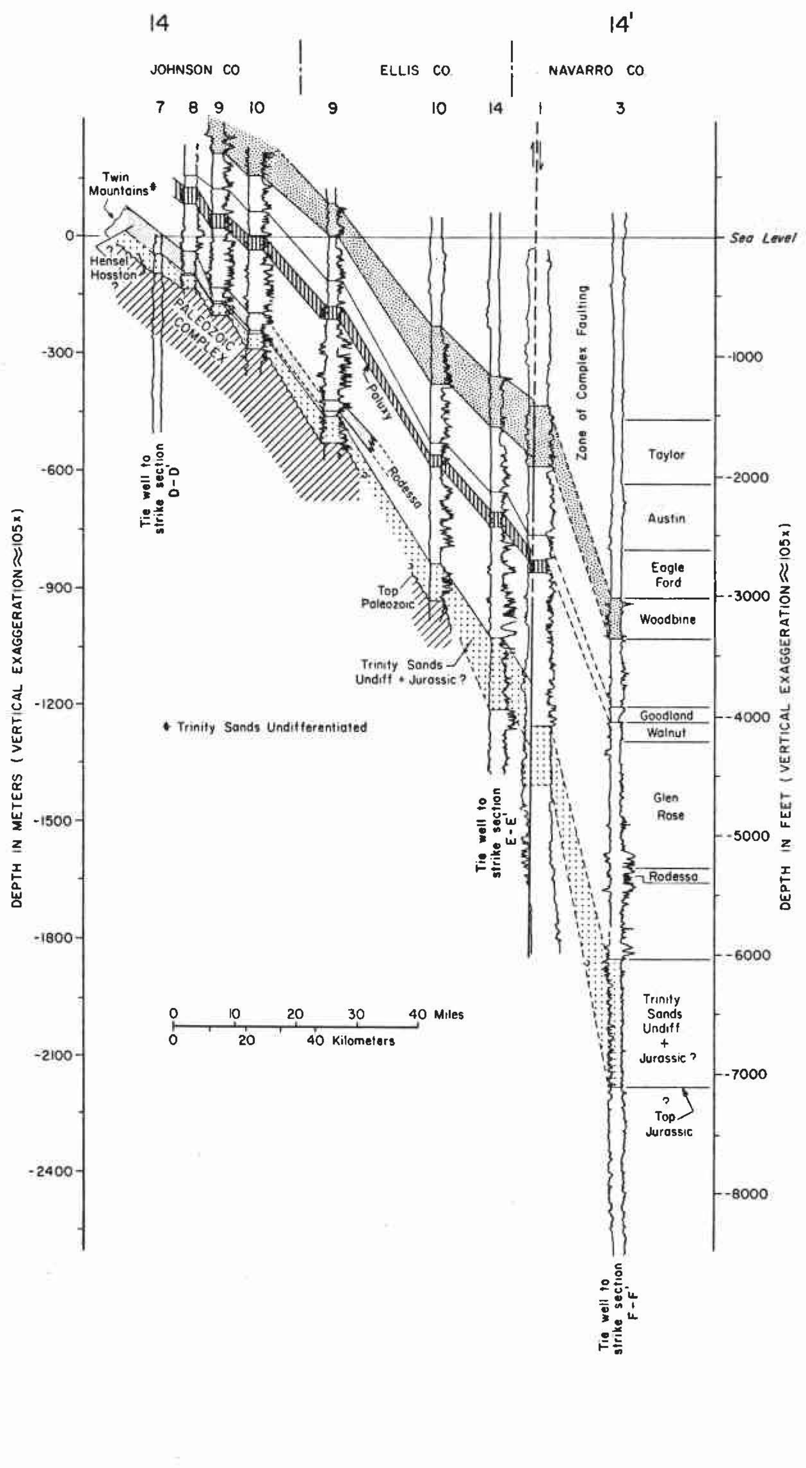


Figure 37. Dip-oriented cross section 14-14' (see figure 4 for location; see appendix for individual well data).

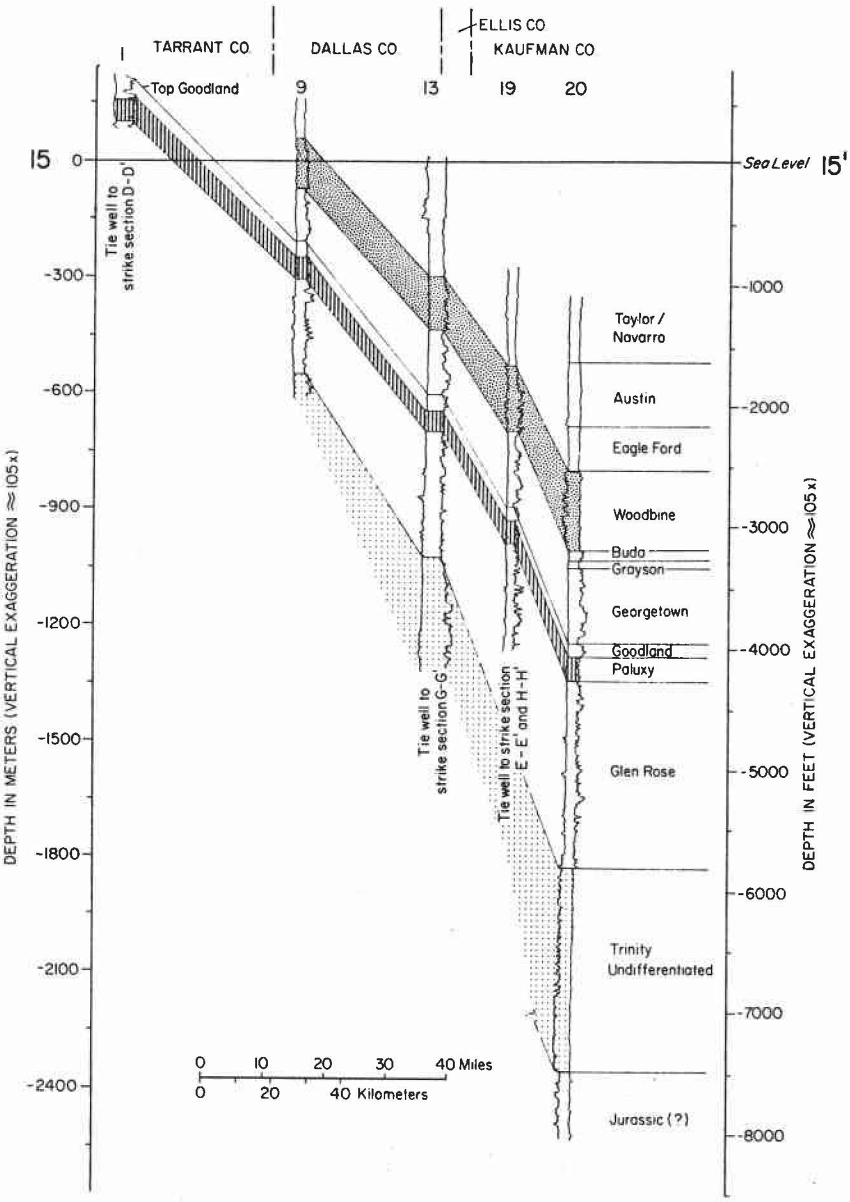


Figure 38. Dip-oriented cross section 15-15' (see figure 4 for location; see appendix for individual well data).

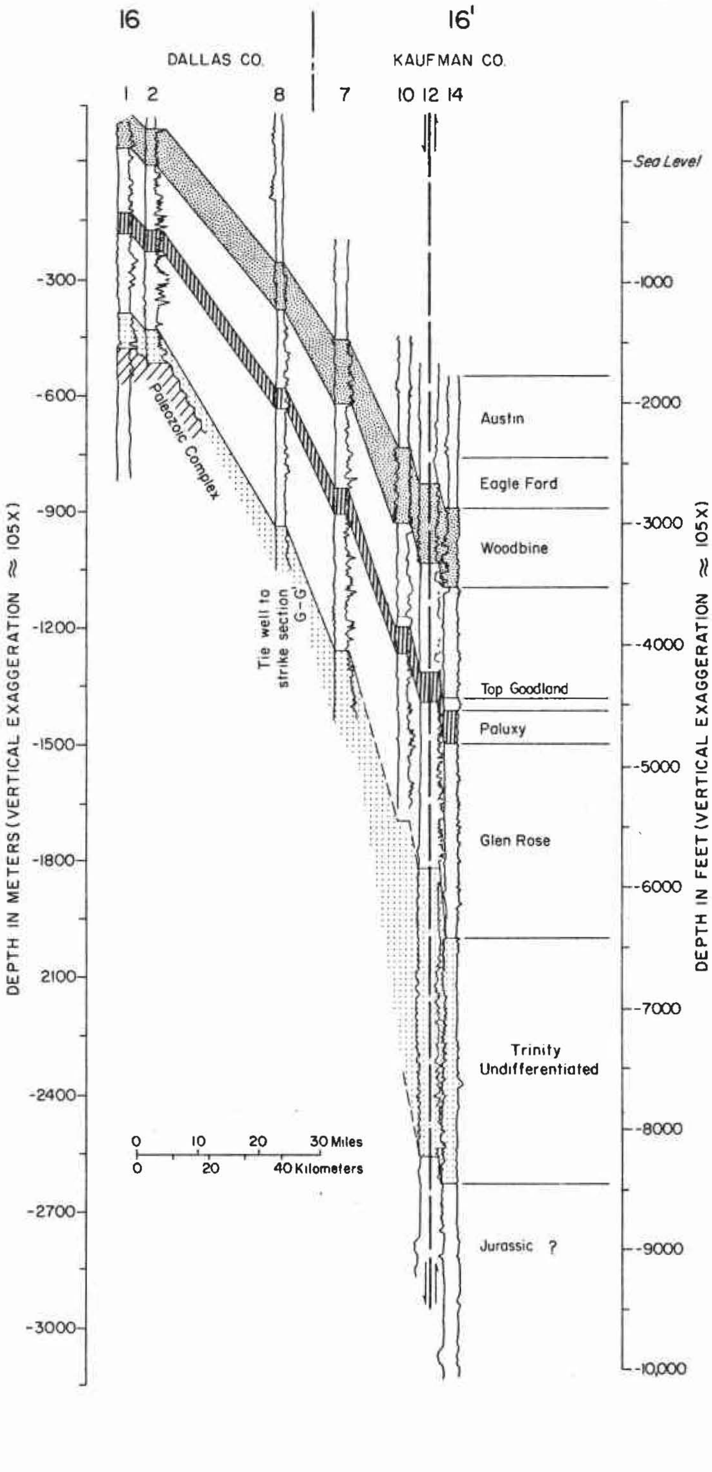


Figure 39. Dip-oriented cross section 16-16' (see figure 4 for location; see appendix for individual well data).

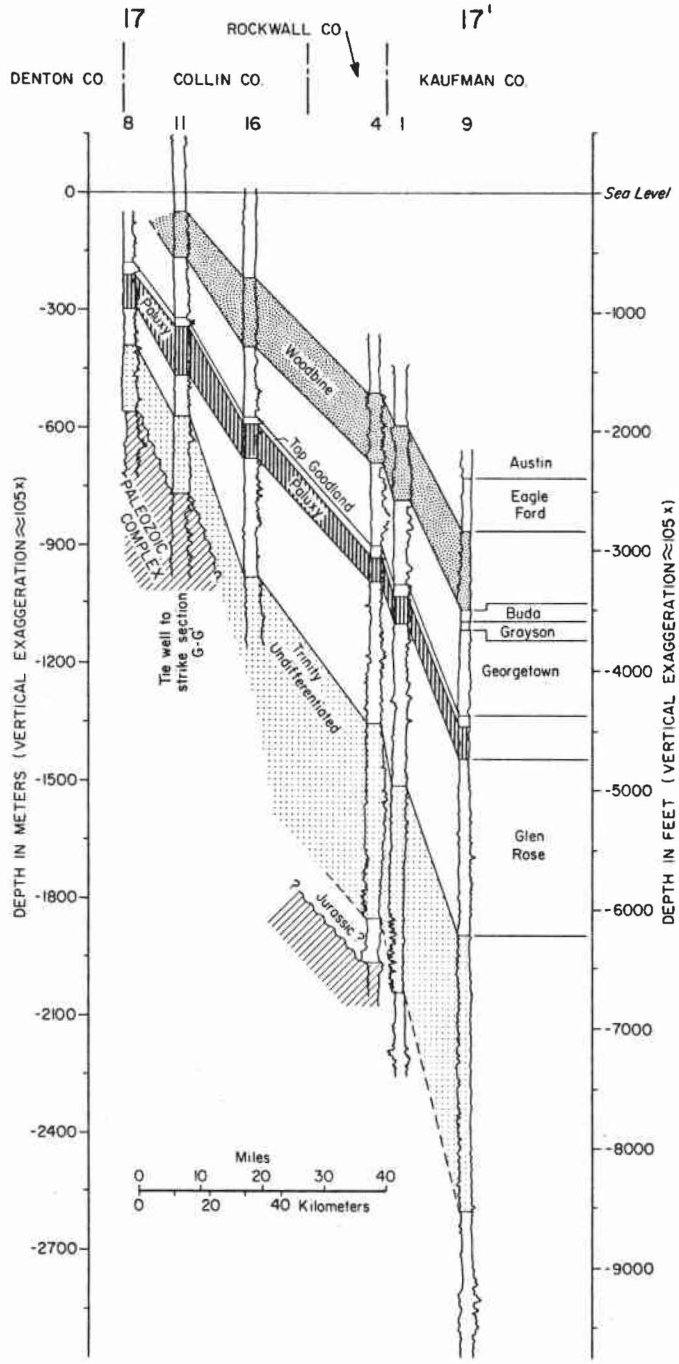


Figure 40. Dip-oriented cross section 17-17' (see figure 4 for location; see appendix for individual well data).

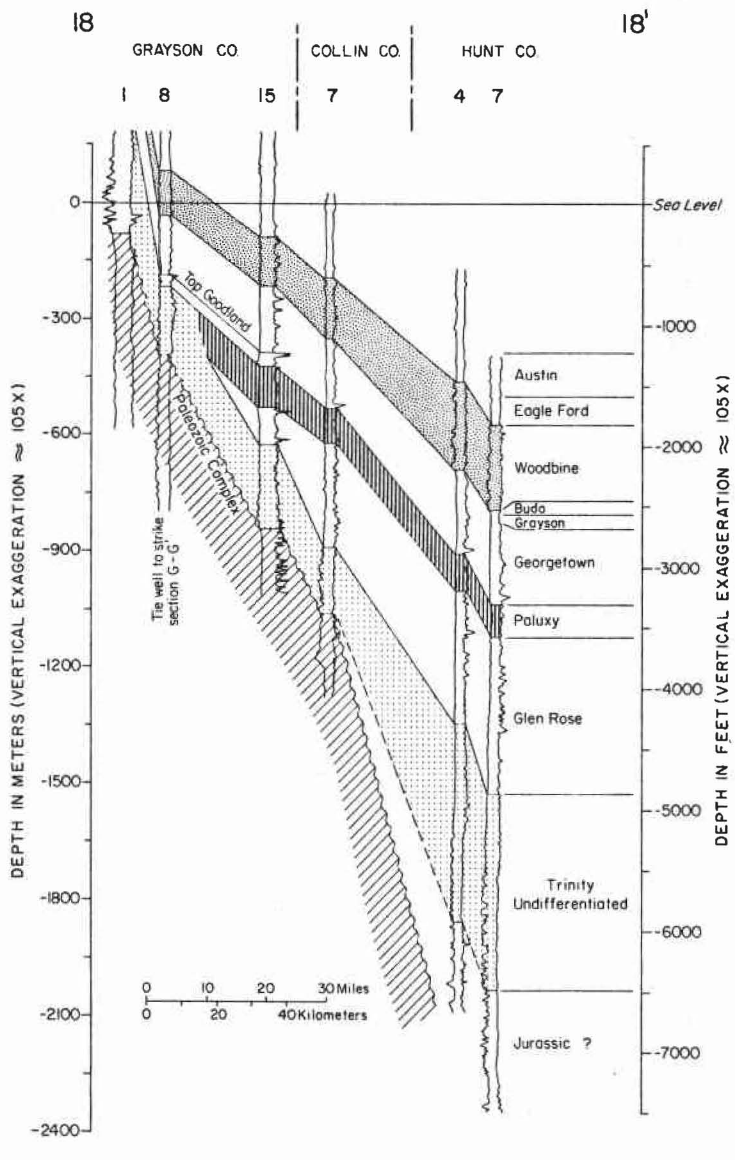


Figure 41. Dip-oriented cross section 18-18' (see figure 4 for location; see appendix for individual well data).

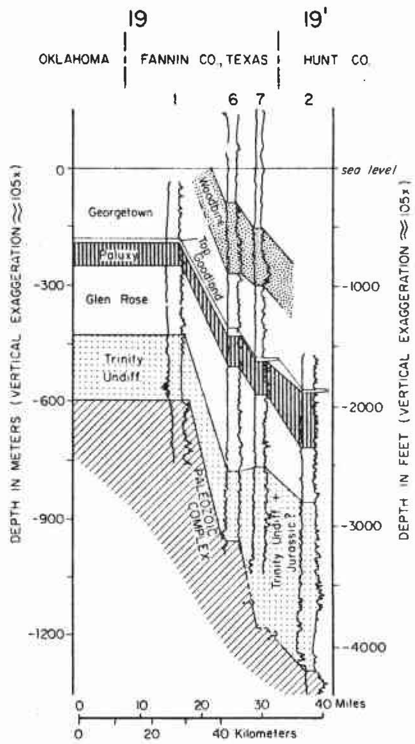


Figure 42. Dip-oriented cross section 19-19' (see figure 4 for location; see appendix for individual well data).

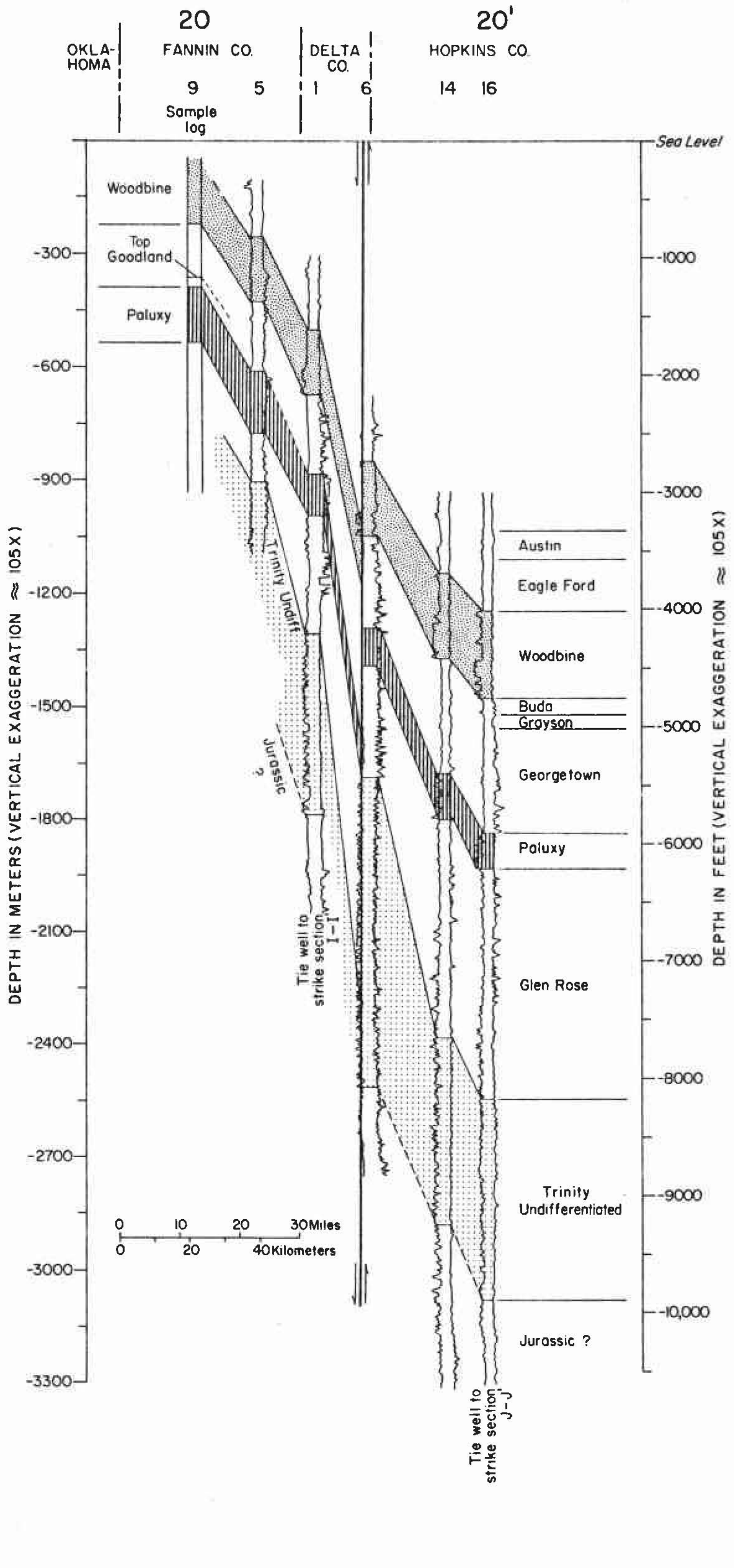


Figure 43. Dip-oriented cross section 20-20' (see figure 4 for location; see appendix for individual well data).

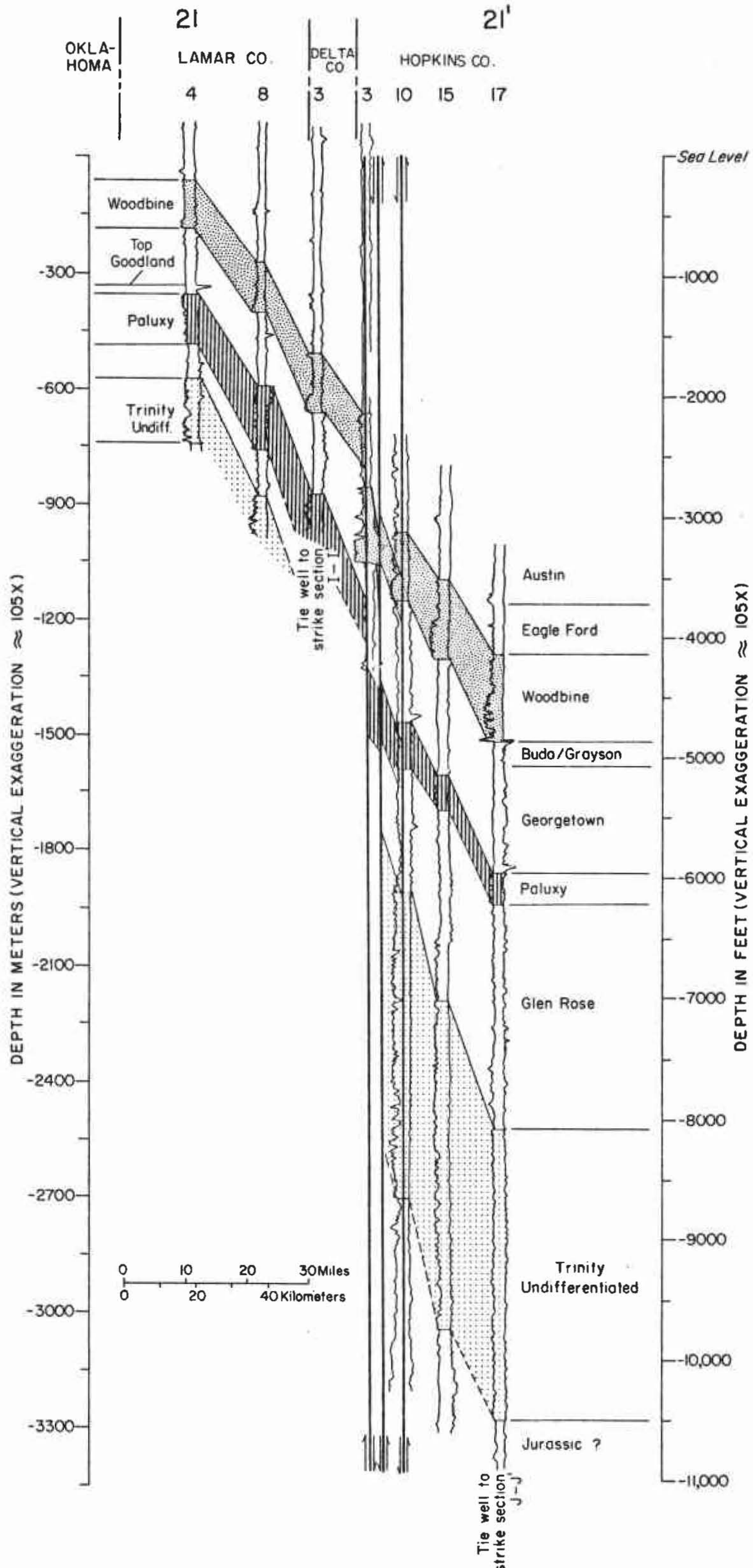


Figure 44. Dip-oriented cross section 21-21' (see figure 4 for location; see appendix for individual well data).

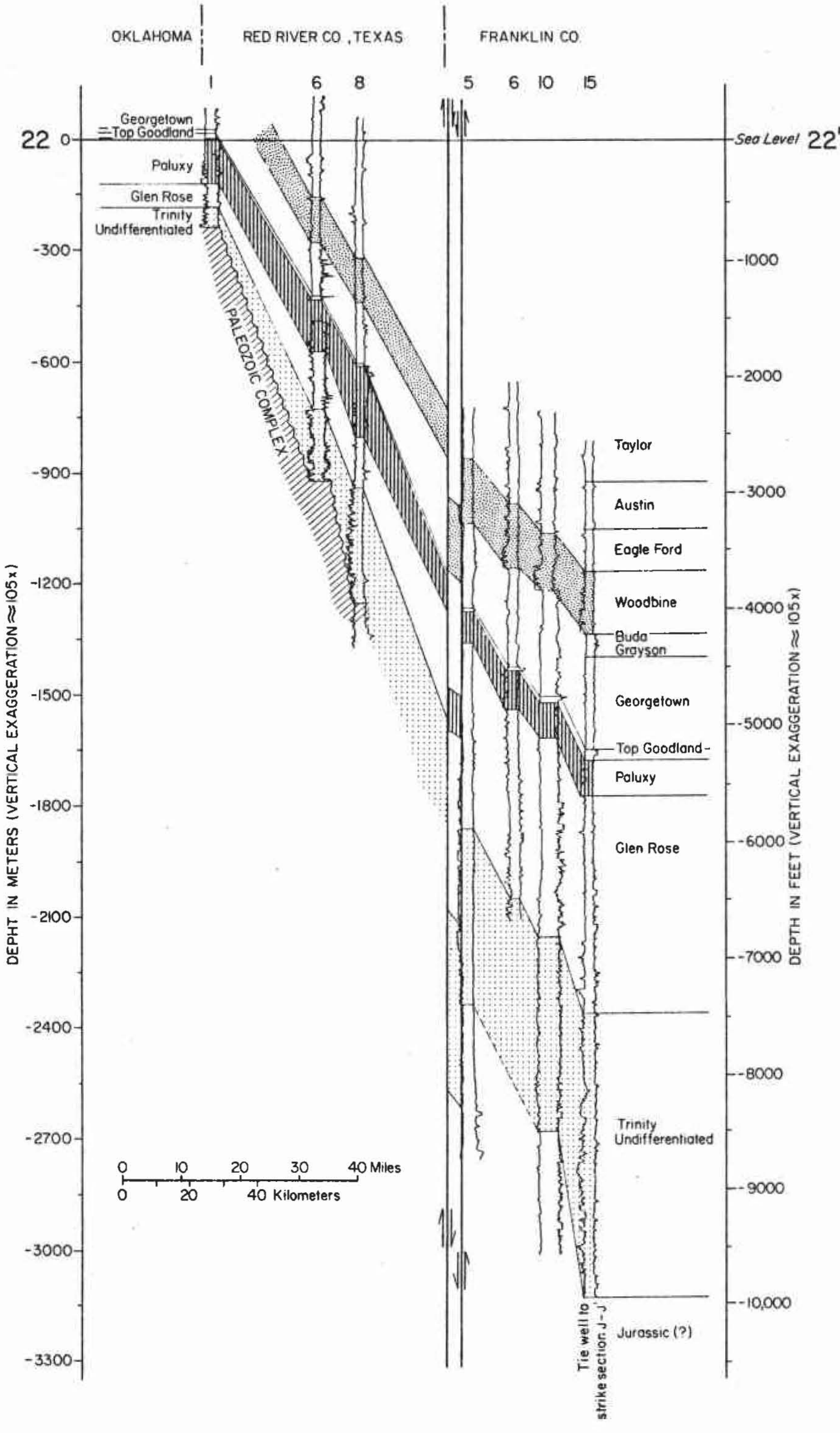


Figure 45. Dip-oriented cross section 22-22' (see figure 4 for location; see appendix for individual well data).

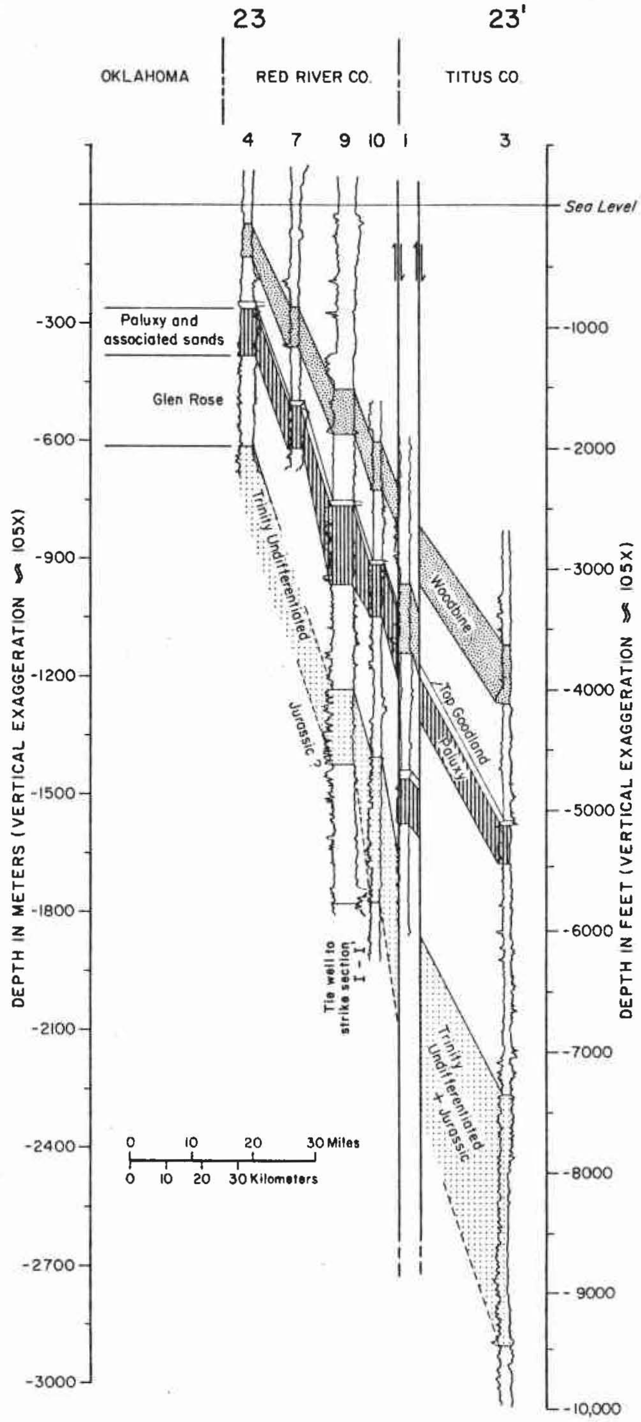


Figure 46. Dip-oriented cross section 23-23' (see figure 4 for location; see appendix for individual well data).

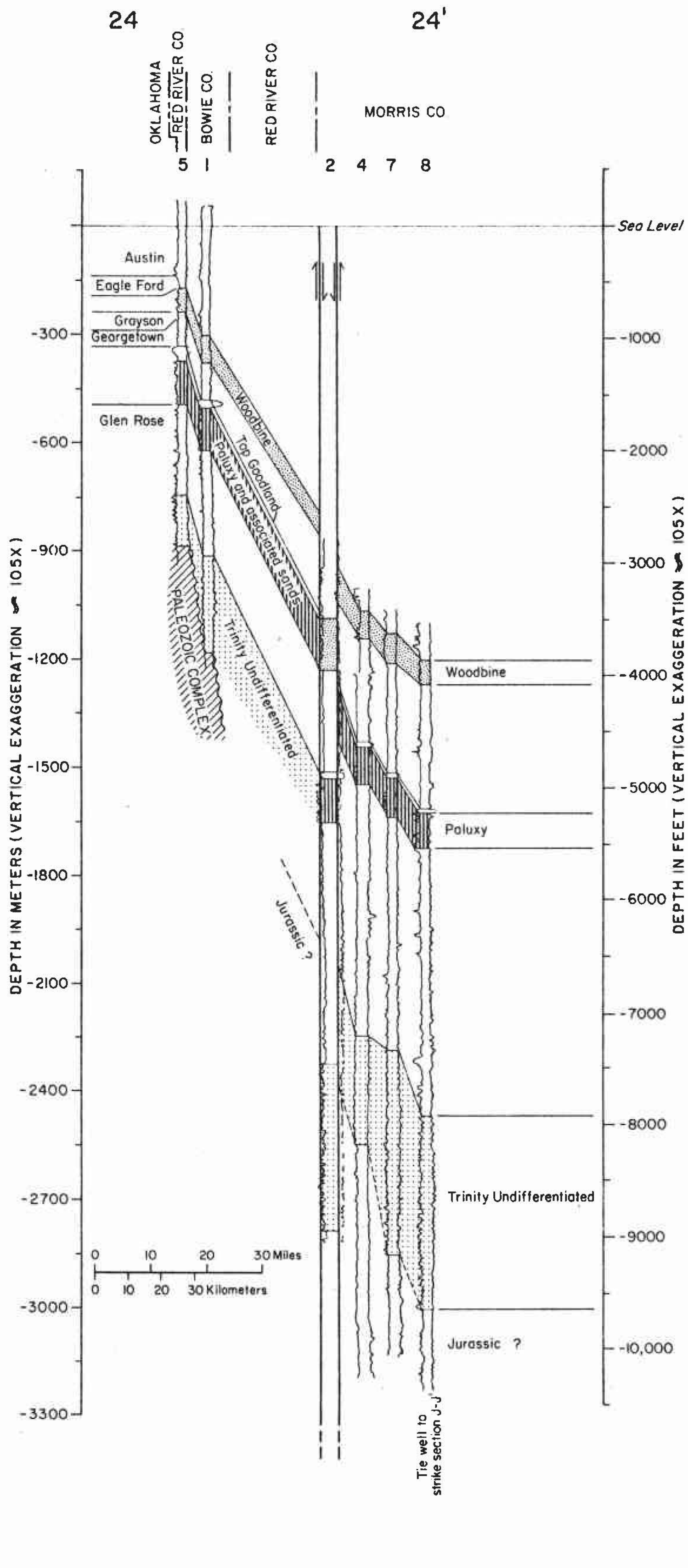


Figure 47. Dip-oriented cross section 24-24' (see figure 4 for location; see appendix for individual well data).

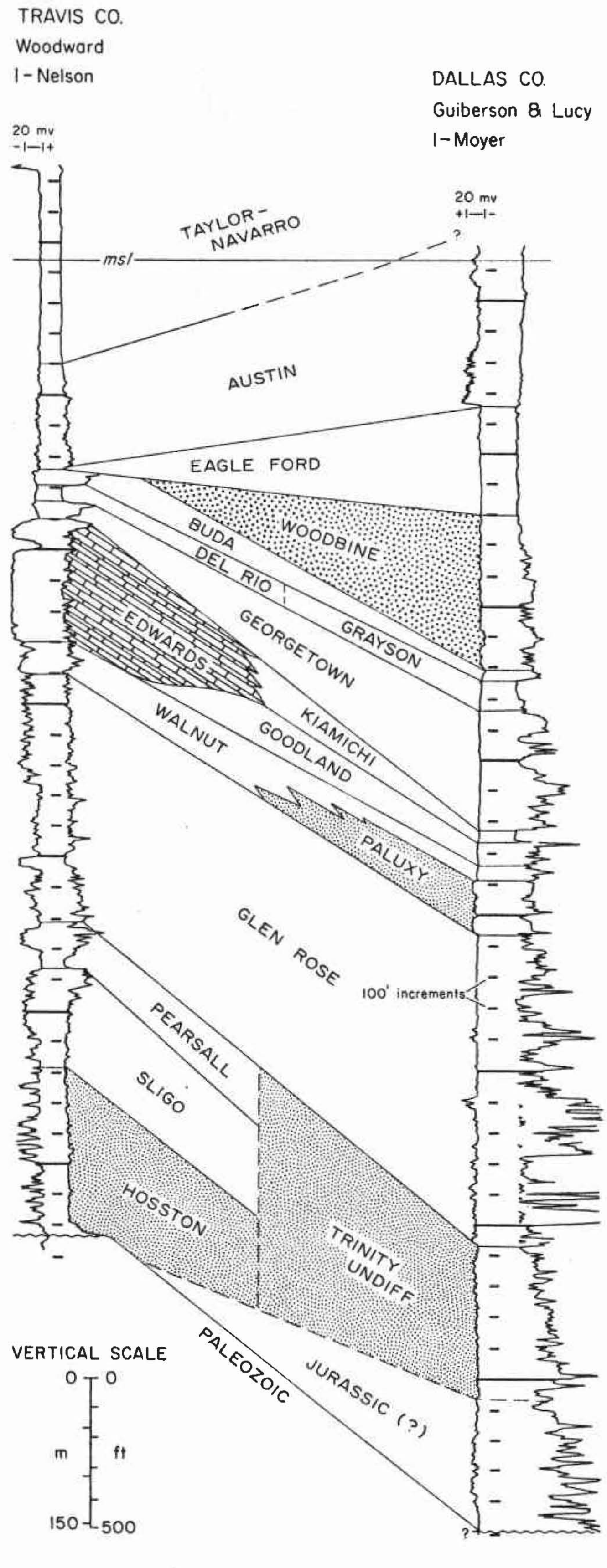


Figure 48. Typical electric logs showing geologic units in Travis County and Dallas County.

PRE-CRETACEOUS SURFACE

General

Pre-Cretaceous rocks exposed in the study region consist of Precambrian igneous and metamorphic rocks that crop out in the Llano area, and the unmetamorphosed Paleozoic "foreland facies" strata (Flawn and others, 1961) that crop out in the Llano area and that occur beneath the Cretaceous strata west of the Balcones Fault Zone. Farther east, in the subsurface, the Ouachita complex becomes progressively more highly deformed and metamorphosed, and dips of the Ouachita rocks become progressively steeper. At the eastern margin of control on the Ouachita complex, there are thick terrigenous and evaporitic (?) strata of presumed Jurassic age.

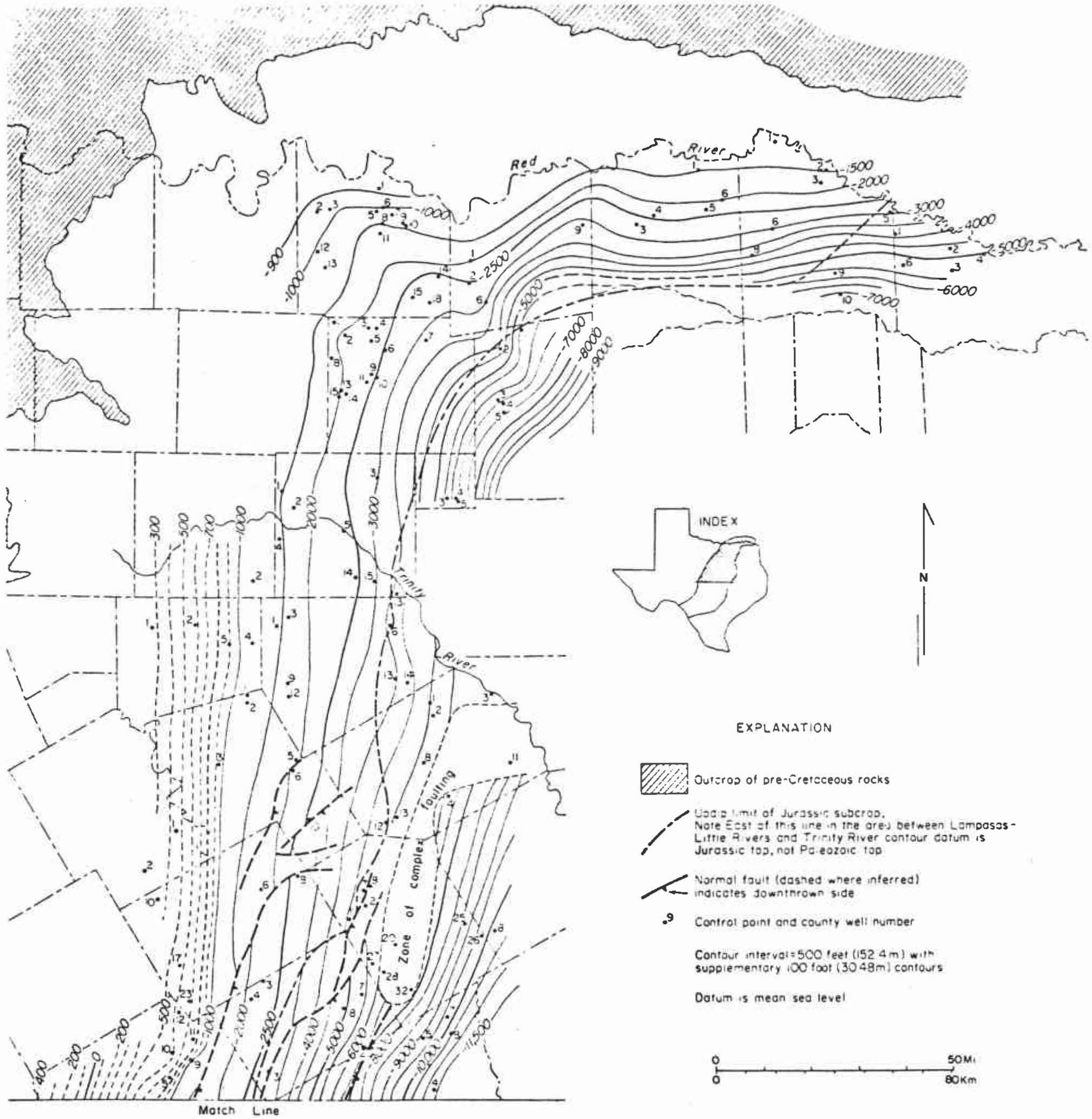
Pre-Cretaceous rocks have affected both composition and geometry of the Cretaceous aquifers in the region investigated. This is because the pre-Cretaceous rocks constituted source materials for many of the overlying clastic sediments, and the late Paleozoic erosion surface composed the substrate on which the updip parts of the basal Cretaceous sandstone units were deposited. Moreover, pre-Cretaceous physiographic and structural conditions affected areal extent of the depositional environments that resulted in the various facies of Cretaceous strata. For example, the structural hinge defined by the eastern margin of the steeply dipping Ouachita belt marked the locus of change from predominantly terrestrial sedimentation to a marine depositional regime during early Cretaceous time. Although numerous transgressive and regressive migrations of the marine environment occurred throughout the early Cretaceous (Stricklin and others, 1971), the hinge line persisted as a zone of major changes between depositional environments. Examples along this trend include the updip subcrop limit of Jurassic strata and facies changes from terrestrial to marine strata for both the Hosston and Hensel sand units in Central Texas. Moreover, it is along this trend that many of the terrigenous rock units change from being dominantly dip-oriented to being mainly strike-oriented, as the depositional environments changed from fluvial and deltaic systems to lagoonal or marine systems. Commonly, there are also drastic compositional changes in rocks representing the different environments of deposition. The dip-oriented systems are dominantly composed of quartzose sand, whereas the strike-oriented units are made up mainly of carbonate rocks, evaporites, or mud. Because of both compositional effects and geometry of rock bodies, the dip-oriented parts of the various rock units have superior aquifer properties. Porosity and permeability are generally higher for these rocks, hence, expected well yields are greater than for other depositional systems. Also, the dip-oriented geometry ensures adequate hydrologic communication with the outcrop (recharge) area, and this mediates both well yield and water quality aspects.

Structural Configuration of the Pre-Cretaceous Surface

The hinge zone separating the Texas Craton from the Gulf coastal province is noted on the structural map of the top of the pre-Cretaceous surface (fig. 49) by a marked steepening of dip. West of the hinge zone, dips are less than 70 ft/mi (13m/km), and are commonly less than 20 ft/mi (4m/km) farther inland. East of the hinge, dips of more than 200 ft/mi (38m/km) are common. The hinge also coincides with the main locus of Balcones faulting, which happens to be a zone of sparse well data in south-central Texas; within this area, paucity of well data prevented our extrapolating contours on various maps. Moreover, there is an abrupt compositional change across the hinge; as denoted by Flawn and others (1961), slightly metamorphosed Ouachita strata of recognizable age abut more intensively metamorphic rocks of unknown age.

When viewed in plan, the pre-Cretaceous surface also shows marked changes in strike. A major structural salient occurs at about the location of the San Marcos Platform, where strike changes from approximately northeast-southwest to nearly east-west. A major embayment occurs along an axis that parallels the Preston Anticline in north Texas; there strike changes from a northeast trend to an approximately east-west orientation. It is in this area that the Arbuckle and Ouachita structural trends converge; also this embayment occurs near where the Ouachita structural belt dips beneath the ground surface. These combine to produce a locally complicated subsurface geologic setting.

On the Texas Craton, erosional topographic features on the pre-Cretaceous surface (the Washita Paleoplain of Hill, 1901, p. 363) determined composition, texture, and overall geometry of subsequent Cretaceous rocks. Topographic relief of more than 200 ft (61 m) is mapped in Kerr County. High-relief areas were local sources of sediments during Cretaceous time, and low-topographic areas determined the major sites of early Cretaceous fluvial deposition (Hall, 1976). Across the hinge zone, in the Gulf coastal province, structural downwarping was more important than initial erosional topographic irregularities on the pre-Cretaceous surface in controlling subsequent Cretaceous sedimentation.


Red River
Trinity River
Zone of complex faulting
INDEX
N
Match Line
EXPLANATION
Outcrop of pre-Cretaceous rocks
Updip limit of Jurassic subcrop. Note East of this line in the area between Lampasas-Little Rivers and Trinity River contour datum is Jurassic top, not Paleozoic top
Normal fault (dashed where inferred) indicates downthrown side
Control point and county well number
Contour interval=500 feet (152.4m) with supplementary 100 foot (30.48m) contours
Datum is mean sea level
0 50Mi
0 80Km

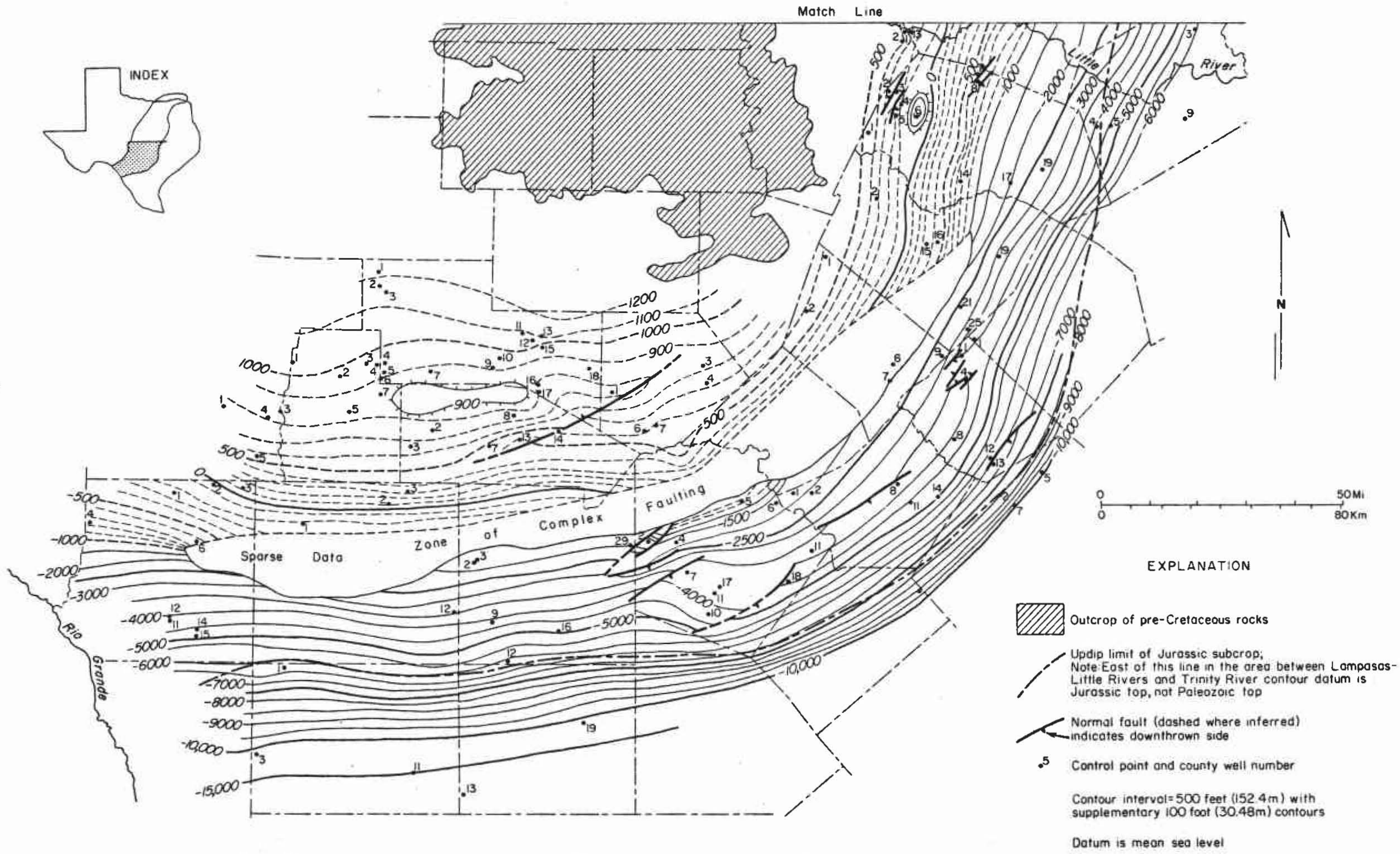


Figure 49. Structural map of pre-Cretaceous surface (on facing pages).

The structural hinge zone marks one of the probable loci of initial rifting of the Gulf of Mexico, as evidenced by the abrupt occurrence of thick sequences of interbedded evaporites and terrigenous clastic sediments composing the presumed Jurassic subcrop (figs. 25, 35, 37, 47). Furthermore, there are very few localities identified where Jurassic(?) strata overlie the Paleozoic basement complex. This relation suggests that during initial rifting, Jurassic strata were formed in a series of periodically subsiding grabens that received terrigenous detritus and that acted as salt flats. Initially, the Ouachita complex was both sediment source and substrate for these Jurassic rocks, but as rifting continued, formation of new (oceanic?) crust and possible local crustal thinning resulted in continued downwarping in the sediment-receiving basins. Tensional forces associated with rifting, coupled perhaps with crustal thinning, resulted in the foundering of the Ouachita Mountains throughout Texas.

The structural scenario presented here is conjectural, but it does affect our formulating hypotheses that explain the origin of anomalous geothermal gradients within the study region. A rift zone is denoted by high heat flow values. Even a "fossil rift" might continue as an area of high heat flow, and given a blanket of insulating sediments (Jurassic[?] and Cretaceous strata), a long-term anomalous geothermal gradient might be the result. Thus, one hypothesis for the source of heat for the warm waters along the Balcones and Luling-Mexia-Talco Fault Zones is that the basement complex there is a relict analogue to the Salton Sea.

Faults provide another explanation of the observed geothermal anomalies. There are numerous normal faults depicted on the structural map of the pre-Cretaceous surface; there are also zones of thrust faulting mapped by Flawn and others (1961). Deep-seated fracture zones might result in anomalously warm ground waters at a relatively shallow depth, and deep circulation of meteoric waters along faults is the prevailing model for the origin of the Hot Springs of Arkansas (Bedinger and others, 1974) and the Warm Springs of western Virginia (Geiser, 1979). Hence, the Ouachita belt may represent a buried analogue to the geothermal conditions at, for instance, Hot Springs, Arkansas.

HOSSTON AND TRINITY SANDS UNDIFFERENTIATED

General

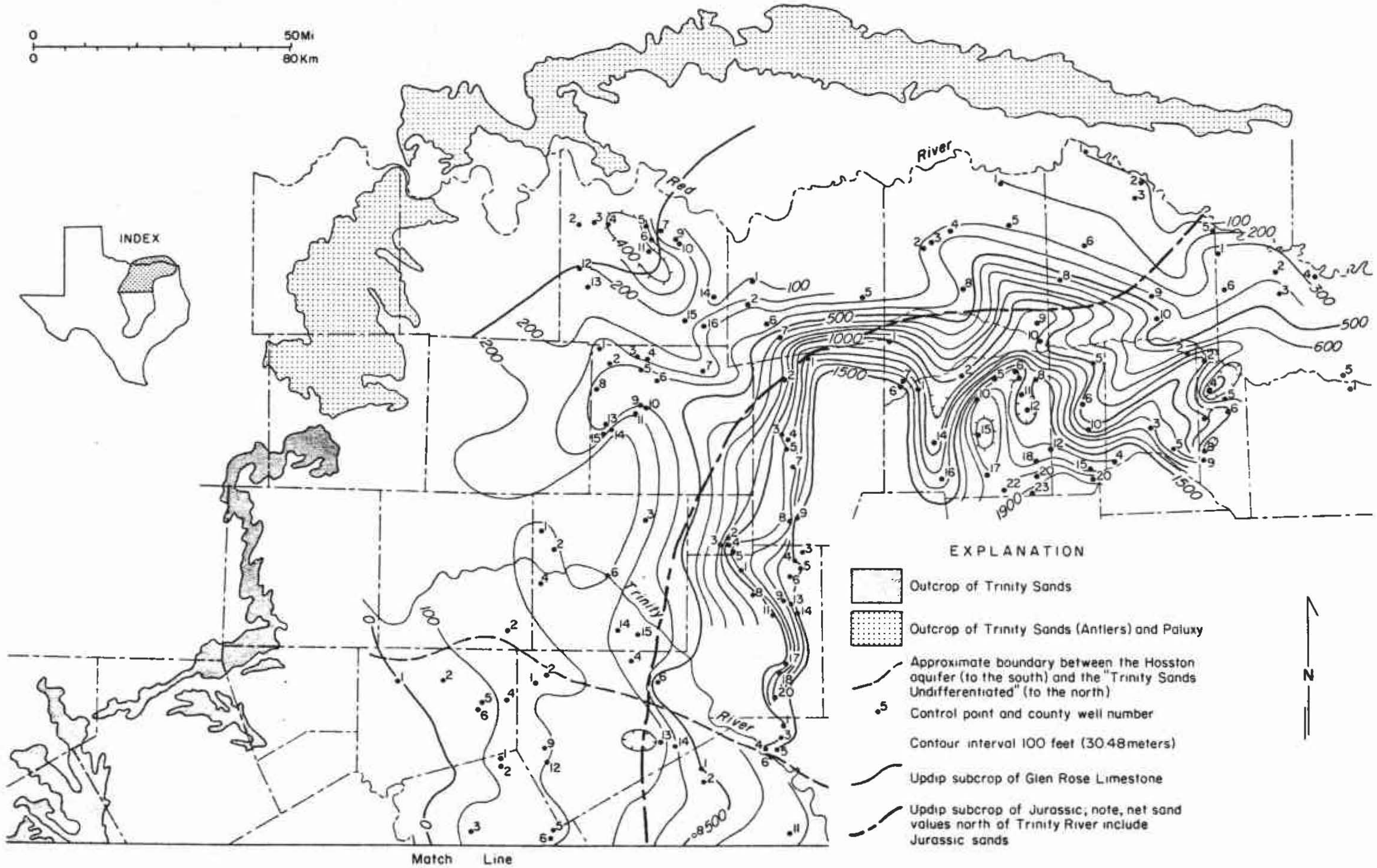
Strata deposited on the pre-Cretaceous surface consist of the various basal Cretaceous sandstone units. These sandstones are mainly riverine or deltaic deposits on the Texas Craton, but across the structural hinge strata, of terrigenous origin end and much thicker lagoonal or offshore marine deposits mark the beginning of the Gulf coastal province.

As mentioned previously, the stratigraphy of the Lower Cretaceous units is complex, and this complexity has been exacerbated by diverse and sometimes overlapping or inconsistent names applied to the same or equivalent strata across the region. In hopes of simplifying this situation, while retaining enough of the stratigraphic nomenclature to communicate effectively, we refer to the basal Cretaceous units as being "Hosston and Trinity Sands Undifferentiated" (see fig. 12). We have drawn the boundary between the Hosston Sand and the Trinity Undifferentiated along a line parallel to, but southwest of, the Trinity River in Johnson, Tarrant, Ellis, and Navarro Counties. However, this boundary is somewhat arbitrary because the basal Cretaceous sands represent several depositional systems, and although the line separating the Hosston from the Trinity Sands is also a boundary between two of these systems, other system boundaries of equal or greater importance are not shown.

Net-Sand Distribution of the Hosston/Trinity

The major depositional systems composing the basal Cretaceous sands are delineated on the basis of aggregate thickness of sand strata as shown on the net-sand map (fig. 50). The values presented here are conservative, as sand thickness of 10 ft (3 m) or less was not included in the computations on which the net-sand map was based. Hence, sand thicknesses are somewhat less than those presented by Hall (1976), even though overall sand trends are the same.

The net-sand map shows clearly distinguishable dip-oriented thick sand trends that correspond to loci of fluvial deposition (fig. 51); the areas between these thick-sand trends are probably interfluvial areas within flood basins or along the delta plains of the Cretaceous river systems. Immediately downdip from the presumed fluvial channels, areas of variable areal extent commonly have either uniform sand thicknesses or have abrupt thickening of sand. These are thought to be deltaic deposits, which are of several types, as suggested by areal geometry and thickness of


0 50 Mi
0 80 Km
INDEX
Red River
Trinity River
Match Line
EXPLANATION
Outcrop of Trinity Sands
Outcrop of Trinity Sands (Antlers) and Paluxy
Approximate boundary between the Hosston aquifer (to the south) and the "Trinity Sands Undifferentiated" (to the north)
Control point and county well number
Contour interval 100 feet (30.48 meters)
Updip subcrop of Glen Rose Limestone
Updip subcrop of Jurassic; note, net sand values north of Trinity River include Jurassic sands
N

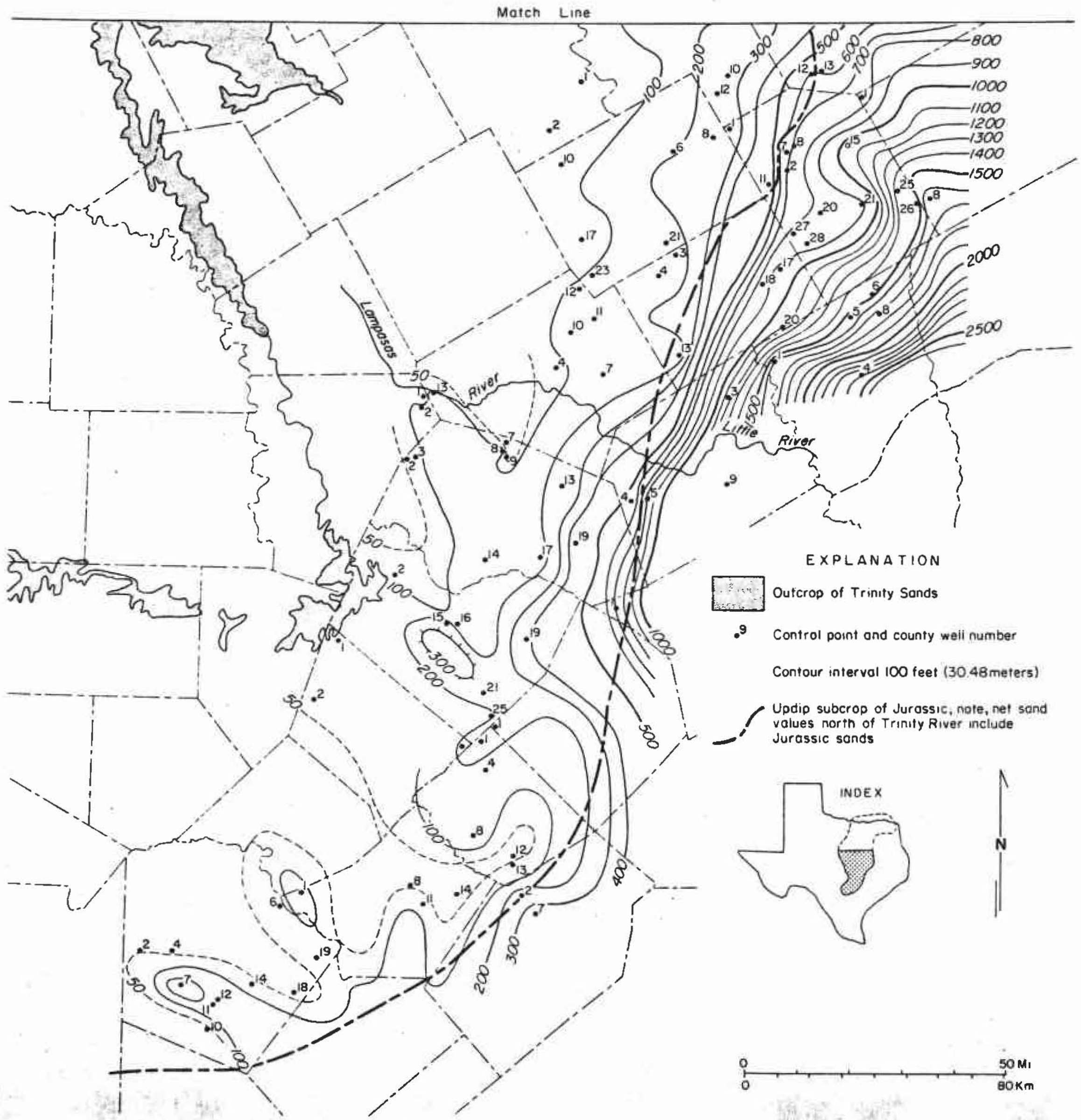


Figure 50. Net sand thicknesses of the Hosston/Trinity (on facing pages).

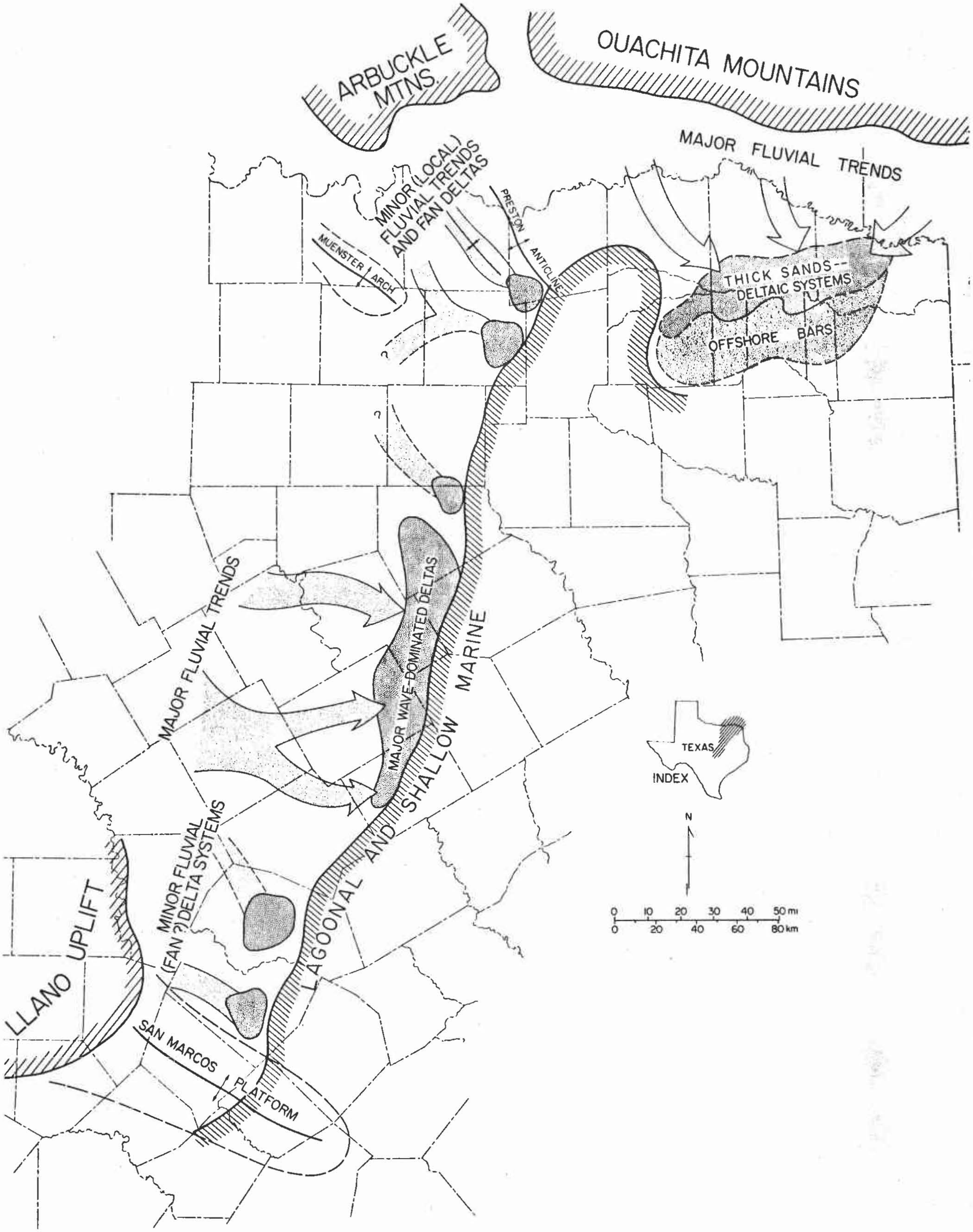


Figure 51. Schematic Hosston/Trinity paleogeographic map.

sand bodies. Some dip-oriented feeder systems terminate either without a broad expanse of sand of uniform thickness or without localized abrupt thickening of sands. We think these represent relatively small fluvial systems that derived sediment from a local source area and that terminated as small fan deltas. The largest of these occur in Grayson and Collin Counties, and lie within the Sherman Syncline. The headwaters of these fan systems probably drained the Arbuckle or Ouachita Mountains, which are only about 75 mi (121 km) to the north. A second type of delta occurs from Falls County north to Ellis County, in which the sand patterns occur as a broad expanse of sands of equal thickness. Hall (1976) has proposed that these represent high-destructive wave dominated deltas. The riverine part of this fluvial-deltaic system is the best documented of any of the Lower Cretaceous sand deposits, and the configuration of these ancient river systems coincides with the parts of the Hosston aquifer having highest yields and best water quality (Henningsen, 1962). The third type of delta occurs in northeast Texas. It has clearly delineated tributary feeder systems that course off the Ouachita uplands. These fluvial deposits terminate in a delta of a form similar to the high-destructive type in Central Texas, but there are also distal sand bodies of relatively great thickness, suggesting a delta-front sand deposit. This would seem to require protection from intense waves and currents (in contrast to the processes acting on the high-destructive delta system). Probably, in this area the Trinity sands were protected from wave action--perhaps by the Sabine Uplift farther south. The delta-front sands of this system offer some of the thickest terrigenous sand deposits in the region, yet these thick sands are not directly related to the outcrop of Trinity Sands only a few tens of miles to the north. Thus recharge probably does not readily occur between the fluvial systems and the sands of the offshore bar facies.

The lagoonal, prodelta, or other marine systems are denoted by abrupt increases in "sand" thicknesses beginning near the structural hinge zone where dips increase precipitously into the Gulf Coast Basin (fig. 34). Much of the apparent sand composing these deposits, however, is carbonate sand, such as dolomite or oolites (Bebout, 1977). Too, the abnormal thickening is partly caused by the probable inclusion of Jurassic strata as part of the aggregate sands measured as Hosston or Trinity Undifferentiated. These thick carbonate sand deposits are of a different genetic system from the dip-fed fluvial-deltaic sand bodies, and hence they are not in direct hydrologic communication with either the recharge areas or the major producing zones of the aquifers. Because of these genetic-geometrical relations, we have focused almost entirely on the geothermal aquifer properties of the fluvial and deltaic deposits that occur on the

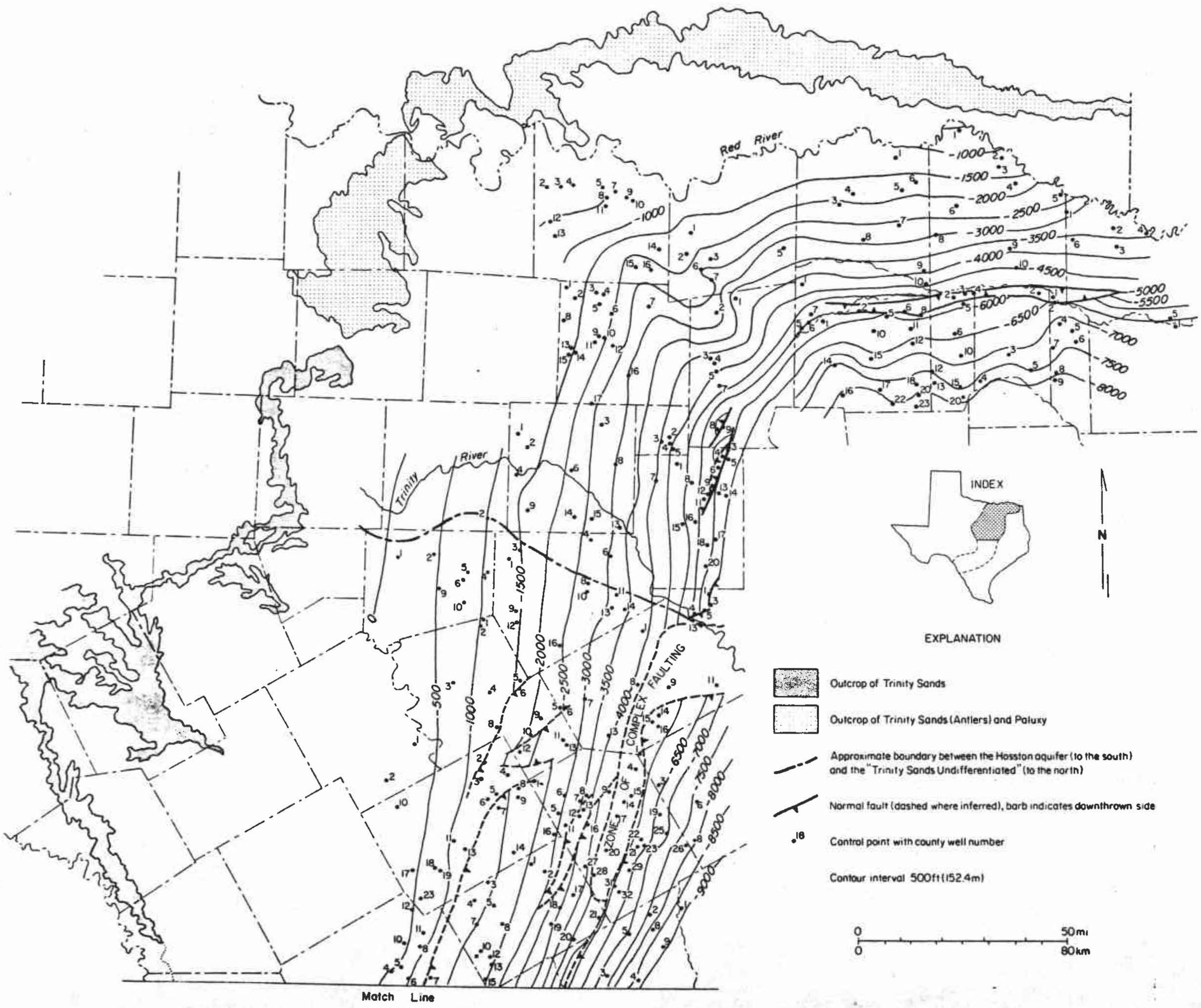
Texas Craton. No water data exist for the lagoonal or marine shelf systems, but we project that water yields would probably be low and of limited duration, and adverse water quality conditions would pose problems with use.

Structural Configuration of the Hosston/Trinity

The structural configuration of the Hosston/Trinity Sands (fig. 52) largely reflects the underlying pre-Cretaceous surface. The hinge zone marking the boundary between the Texas Craton and the Gulf coastal province persisted into Cretaceous time, although the updip limit of Sligo deposition in south-central Texas indicates a transgression of marine conditions during the late stages of Hosston/Trinity deposition. Other structural or topographic irregularities present on the late Paleozoic surface also apparently affected the Hosston/Trinity depositional configuration; for example, the salient that marks the change in strike orientation near the San Marcos Platform persists, as does the embayment in North Texas. The Preston Anticline and the Sherman Syncline appear on both structural maps, as does the (unnamed) high-relief area in Kerr County. However, structural features in southwest Texas, the Devil's River Uplift and the Chittim Anticline, affected the Hosston structural setting but is not noted on the structural map of the pre-Cretaceous surface. Also, some topographic structural irregularities on the pre-Cretaceous surface do not appear on the Hosston/Trinity structure map (the localized topographic high in Williamson County is one example).

Dip on the top of the Hosston/Trinity ranges from a low of approximately 10 ft/mi (2 m/km) on the Texas Craton in Bandera County to nearly 500 ft/mi (97 m/km) in the Gulf coastal province (Wilson County).

Although a few normal faults apparently have affected the pre-Cretaceous structural setting, normal faults become a major aspect of the regional structural setting of the Hosston/Trinity systems. Most of the faults displacing basal Cretaceous strata occur from Bexar County north into Travis and Williamson Counties. Likewise, maximum mapped displacement of approximately 350 ft (107 m) occurs along this trend. Most displacement is down-to-the-coast, but there is clearly defined up-to-the-coast faulting of the Luling System in Bexar, Guadalupe, and Caldwell Counties. Displacement there is as much as 400 ft (122 m). Both up-to-the-coast and down-to-the-coast faulting occurs in the Talco system, and a narrow graben is defined in Hopkins, Franklin, and Titus Counties. Detailed fault trends are not shown within the main part of the Mexia Fault Zone, and even though surface displacement indicates that the main aspect of faulting there is up-to-the-coast, local data indicate the


Red River
Trinity River
-1000
-1500
-2000
-2500
-3000
-3500
-4000
-4500
-5000
-5500
-6000
-6500
-7000
-7500
-8000
0
500
1000
1500
2000
2500
3000
3500
4000
6500
7000
7500
8000
8500
9000
ZONE OF COMPLEX FAULTING
INDEX
N
EXPLANATION
Outcrop of Trinity Sands
Outcrop of Trinity Sands (Antlers) and Paluxy
Approximate boundary between the Hosston aquifer (to the south) and the "Trinity Sands Undifferentiated" (to the north)
Normal fault (dashed where inferred), barb indicates downthrown side
Control point with county well number
Contour interval 500ft (152.4m)
0
50mi
0
80km
Match Line

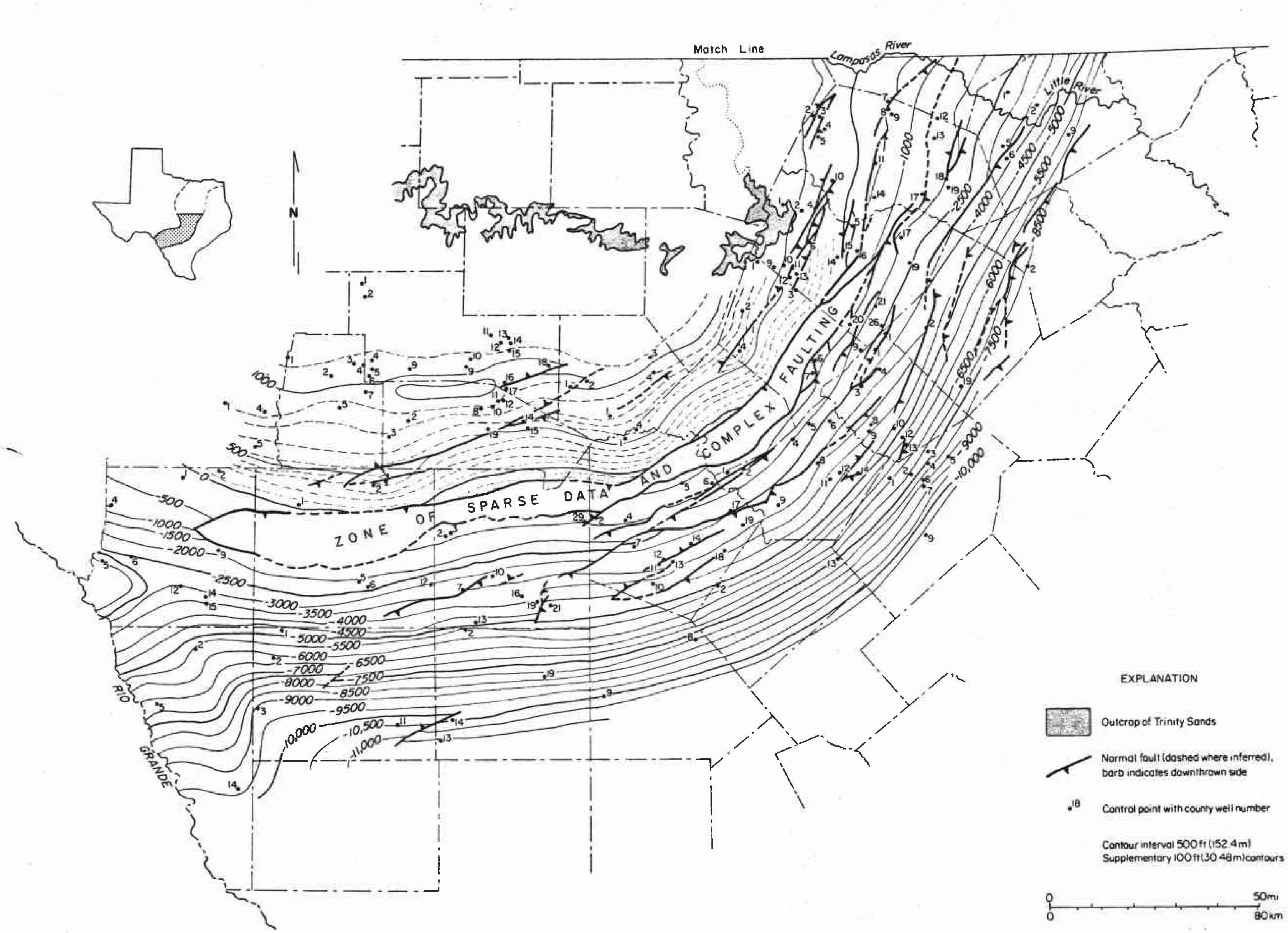


Figure 52. Structural configuration of the Hosston/Trinity (on facing pages).

major displacement to be down-to-the-coast (Hayward and others, 1979). Also, because of sparse data, the individual fault traces in part of the Balcones Fault Zone are not depicted; this area is denoted on the structure map as "zone of complex faulting."

The larger number of faults displacing Cretaceous strata as compared with the number that displace the underlying pre-Cretaceous rocks may be due to several factors. It may be a function of incomplete subsurface data for the pre-Cretaceous surface. Although in updip areas such as in Kerr and Bandera Counties, where control is of comparable quantity and quality for Cretaceous and pre-Cretaceous horizons, the Cretaceous strata nonetheless appear to be more intensely faulted. Still, more faults might displace the Paleozoic complex than are depicted on the structural map of the pre-Cretaceous surface; pre-Cretaceous faults might not appear on the map because of small scale or low density of control. Another explanation for the disparity in the number of faults affecting the pre-Cretaceous surface and the Lower Cretaceous strata might be the differences in competency of rocks affected. The stresses that result in intense faulting of the Cretaceous sands simply might not have deformed the underlying pre-Cretaceous complex in a way that is discernible on the maps presented here. A third possibility, and one suggested by certain interpretations of the central part of the study region (Hayward, 1978) is that growth faulting may have occurred during deposition of the Hosston. However, a comparison of fault trends to isopach or net sand data does not support this on a region-wide basis at our working scale. More detailed investigations, however, might prove this hypothesis to be correct.

General Aquifer Properties of the Hosston/Trinity

Data on water level, water quality, and water temperature are presented for an area from Travis County, north to Cooke and Grayson Counties at the Oklahoma border. The scarcity of water data in relation to the broad scope of the maps of the Hosston/Trinity lithic framework is due to the limited areal extent in which the Hosston-Trinity is used as an aquifer. In northeast Texas, no known localities exist east of Dallas, Collin, and Grayson Counties where the Trinity sands are tapped for ground-water supplies. In south-central Texas, there are a few localities within the Balcones Fault Zone in Bexar and Uvalde Counties where the Hosston supplies water needs, but these data points are too scattered to allow confident extension of our maps into that area. The San Marcos Platform appears to have acted as a barrier, south of which lithic properties are not conducive to ground-water production within the Balcones Fault Zone. Updip of the Balcones Fault Zone, in Kendall, Kerr, and Bandera Counties, water from the Hosston is commonly used for domestic and livestock purposes. But in these areas, the aquifer lies at relatively shallow depths and is close to its outcrop (recharge) area; hence, it does not exhibit elevated water temperatures. Also, no continuous water data link this part of the Hosston with the main part of the study region farther east; therefore, we omitted that part of the Hosston from our consideration of aquifer properties.

Water Level of the Hosston/Trinity

The water level map for the Hosston/Trinity is based on data collected by the Texas Department of Water Resources during November 1976 (fig. 53). Because the data points used to construct this map were collected at nearly the same time, the contour lines approximate the potentiometric surface at that time. Assuming that these contours delineate the potentiometric surface, flow paths can be constructed (Hall, 1976), and possible ground-water divides are discernible. Also, cones of depression are easily seen on this map, and they correlate with areas of major withdrawal from the aquifer. Zones of intensive ground-water production also affect the locations of ground-water divides and the convergence of flow lines; thus water level (potentiometric surface) is a result of the natural aquifer conditions and the intensity of human use of the ground-water supply.

The most notable area where water level has declined in apparent response to human use is along the "Interstate-35 growth corridor" (Allen, 1975; Baldwin, 1974) from Waco north to Ellis and Johnson Counties. As noted by Hayward and others (1979), the effect of this "trough of depression" is to reverse the potentiometric gradient for the Hosston aquifer east of the trough, and this probably eliminates recharge east of the I-35 corridor. The trough might also adversely affect water quality because of movement of lower-quality waters from downdip areas farther east in response to the reversal of the "normal" potentiometric surface. Other local areas of depressed water level occur in western Travis County in response to intensive residential development along the lakes there, and in Tarrant and Dallas Counties, owing to local municipal, residential, and industrial uses in those urban areas.

The apparent "natural" effects on the water level of the Hosston aquifer include the various structural features of the region and the configuration of sand bodies. In general, the water level surface is oriented in the same direction as structural dip, except where intensive use results in depression cones or troughs. But because of artesian conditions, the dip of the water level is subdued compared with the inclination of the aquifer host formation; commonly the water level surface dips basinward at

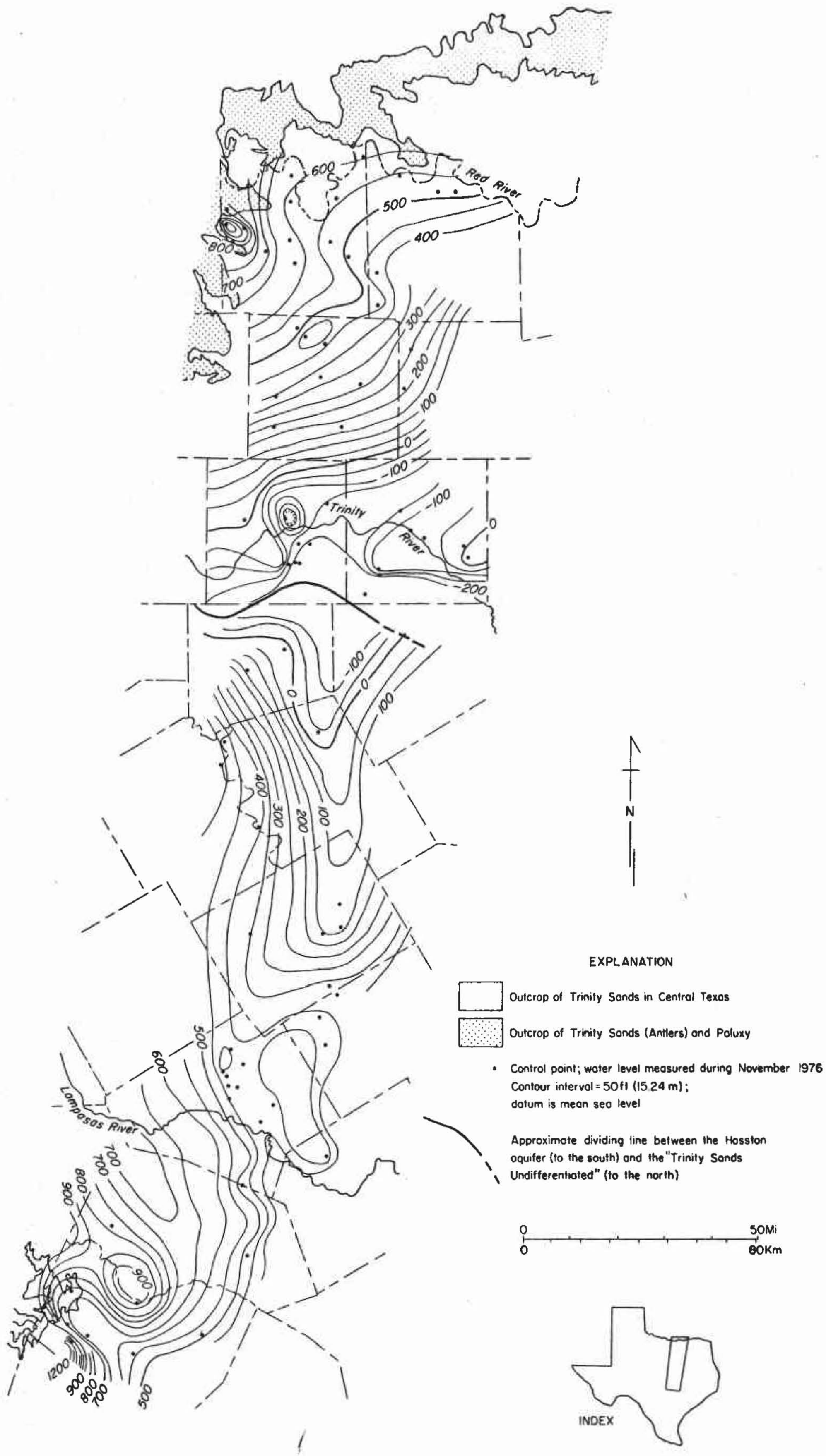


Figure 53. Water level contours for the Hosston/Trinity aquifer.

approximately 4 ft/mi (0.8 m/km). Hence, in the eastern part of the aquifer, the water commonly rises more than 2,000 ft (610 m) under artesian pressure.

Various local effects on water level occur throughout the region. Areas of relatively high water level correspond to high net-sand thicknesses, and the San Marcos Platform, which is an area of thin net sands, delineates an apparent ground-water divide. Other examples include the water level divides trending from northwest to southeast in Williamson County, and from west to east in northern Bell County. The apparent divide near the Tarrant and Johnson county line is probably due to discontinuities of data because of nomenclatural changes between the Hosston aquifer and the various other Trinity sands.

Water Quality of the Hosston/Trinity

As expected, total dissolved solids (TDS) content of Hosston/Trinity ground water increases with increased aquifer depth (fig. 54). Values range from less than 500 mg/l in updip areas to more than 10,000 mg/l downdip. Another general control on water quality in the updip reaches of the aquifer is thickness of sand bodies. Thicker sands generally possess better water quality (lower TDS), as noted in southwestern Travis County and in eastern McLennan County where low TDS values roughly conform to configuration of relatively high sand thicknesses. There are, however, deviations from these general conditions, and these deviations may result from (1) pollution of the aquifer from human activities at the ground surface, (2) improper casing of wells and, thus, mixing of waters from various levels, (3) faults that provide conduits among different strata, and (4) major changes in facies or depositional systems.

Human-derived contamination commonly occurs in the updip reaches of the aquifer, where pollutants may enter in the recharge zone and are evidenced by localized increases in TDS content. Such a condition might have caused the anomalously high TDS values contoured in northwestern Travis County. However, the increase there might also be explained by circulation along faults of waters from various strata. The area in northwestern Travis County is bounded by faults; also, it lies immediately off a major sand trend so that a facies change might have contributed to the local anomaly. Clearly, the source of localized waters having high TDS values is not easily ascertained. Often a combination of processes might produce the observed anomalies.

Certain water-quality effects are not local anomalies, but occur region-wide instead. A striking example is the precipitous increase in TDS content at the boundary between the fluvial-deltaic systems and the prodelta, lagoon, and shelf (?) systems.

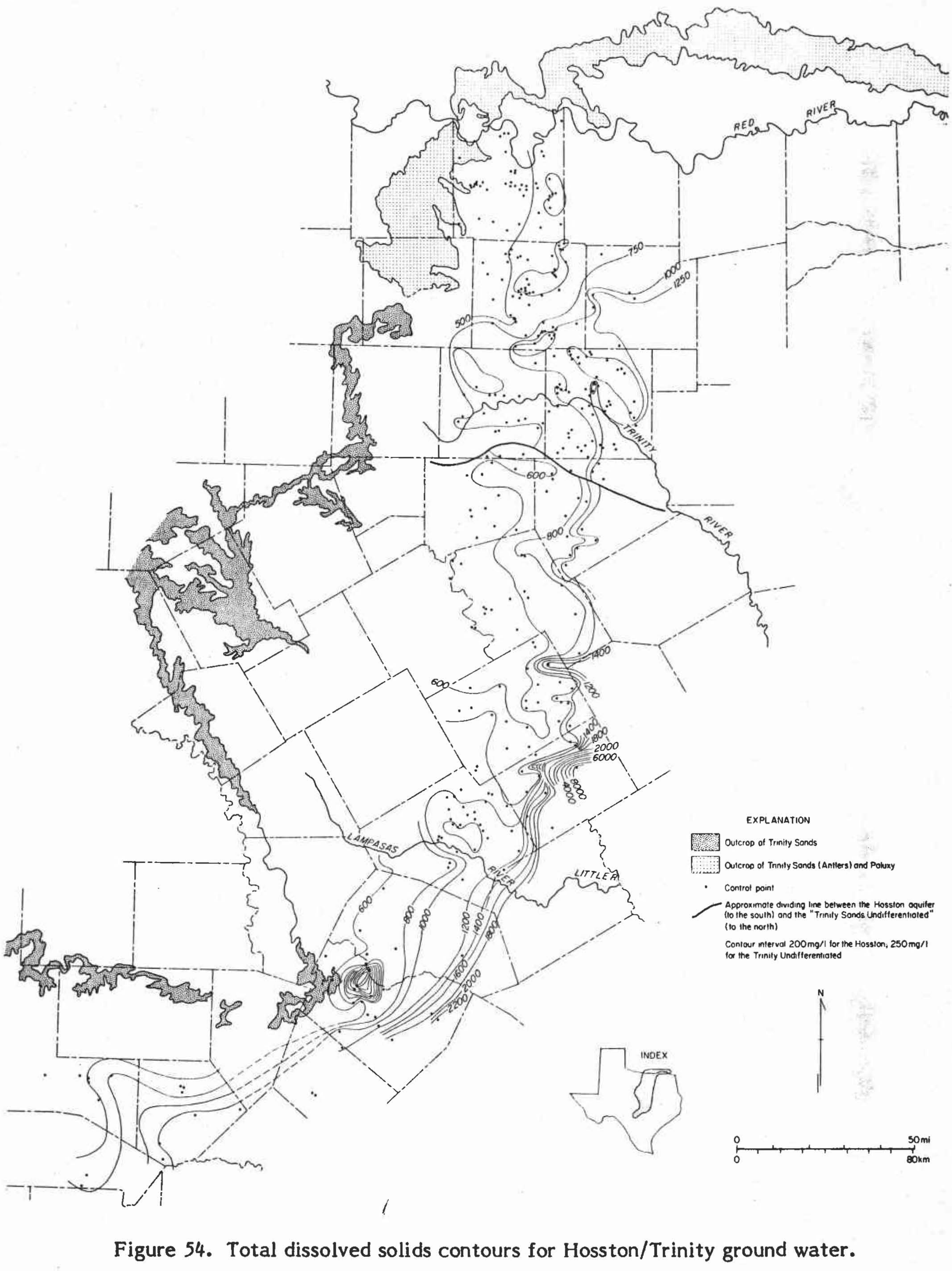


Figure 54. Total dissolved solids contours for Hosston/Trinity ground water.

This condition is most clearly seen along the downdip terminus of the high-destructive wave-dominated delta system in Falls, McLennan, and Hill Counties. There, dissolved solids are generally less than 800 mg/l within the fluvial and deltaic deposits, but values on the downdip side of this depositional boundary are commonly more than 1,000 mg/l. Hall (1976) also noted a change in chemical character of waters from the calcium and magnesium bicarbonate ion suite in waters from fluvial sands to sodium bicarbonate in waters from deltaic deposits. Hall attributed progressively higher sulfate waters in downdip reaches of the aquifer to mixing with waters from the Glen Rose Limestone. Higher sulfate content, however, is expected in waters of marine origin (Hem, 1970).

Piper diagrams showing major anion and cations of Hosston waters in McLennan (fig. 55) and Travis Counties (fig. 56) demonstrate changes in water chemistry from updip to downdip parts of the aquifer. Both counties lie along the Balcones Fault Zone, hence in both areas the Hosston occurs across a range of depth and represents a variety of depositional modes. However, in Travis County the change from updip to downdip is more compressed in that the fluvial deposits occur in the western part of the county, whereas prodelta and lagoonal (?) facies occur farther east. Thus, the water chemistry in Travis County shows some attributes of the fluvial systems as well as attributes of deltaic and lagoonal strara; whereas in McLennan County the water characteristics are typical of deltaic systems, and only to a lesser extent do they reflect the typical ionic content of fluvial facies.

Water Temperature of the Hosston/Trinity

Water temperatures range from less than 70° F (21° C) near the outcrop in Cooke County to more than 140° F (60° C) in Falls County (fig. 57). Water temperature values, like water quality, generally reflect structural configuration and net-sand thicknesses of the aquifer (figs. 50 and 52). Simply stated, the deeper the aquifer, the hotter the waters; whereas dip-oriented sand trends mediate water temperatures. Anomalously low water temperatures occur in structurally deep parts of the aquifer in eastern Travis County and in south-central McLennan County. These trends correlate approximately with fluvial and deltaic sands in those counties. However, these generalizations are ambiguous in places; in Hill County, for example, relatively higher water temperature values occur along a fluvial trend, just as the relation between water temperature and TDS is not altogether straightforward at every locality.

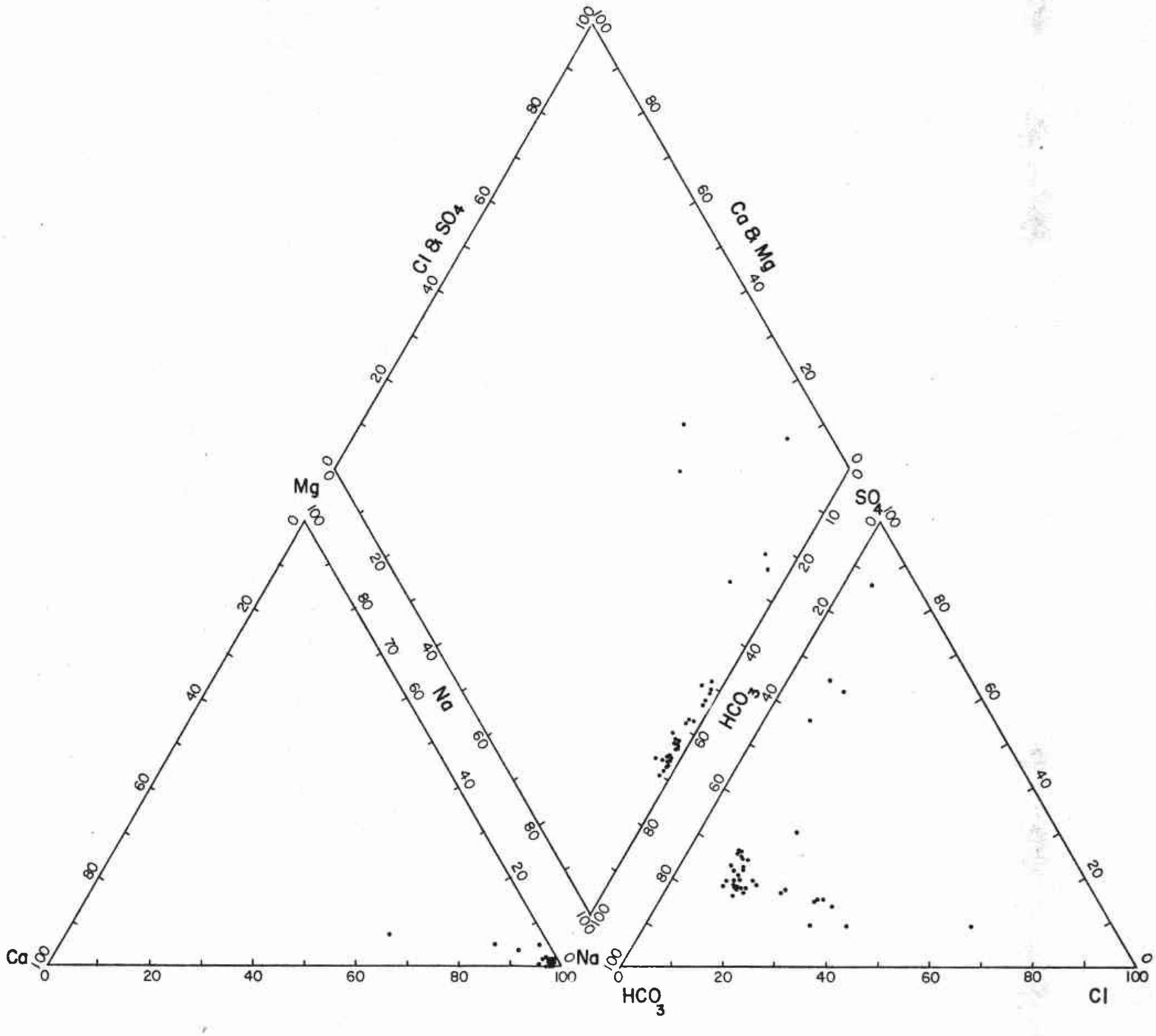


Figure 55. Piper diagram for Hosston ground water--McLennan County.

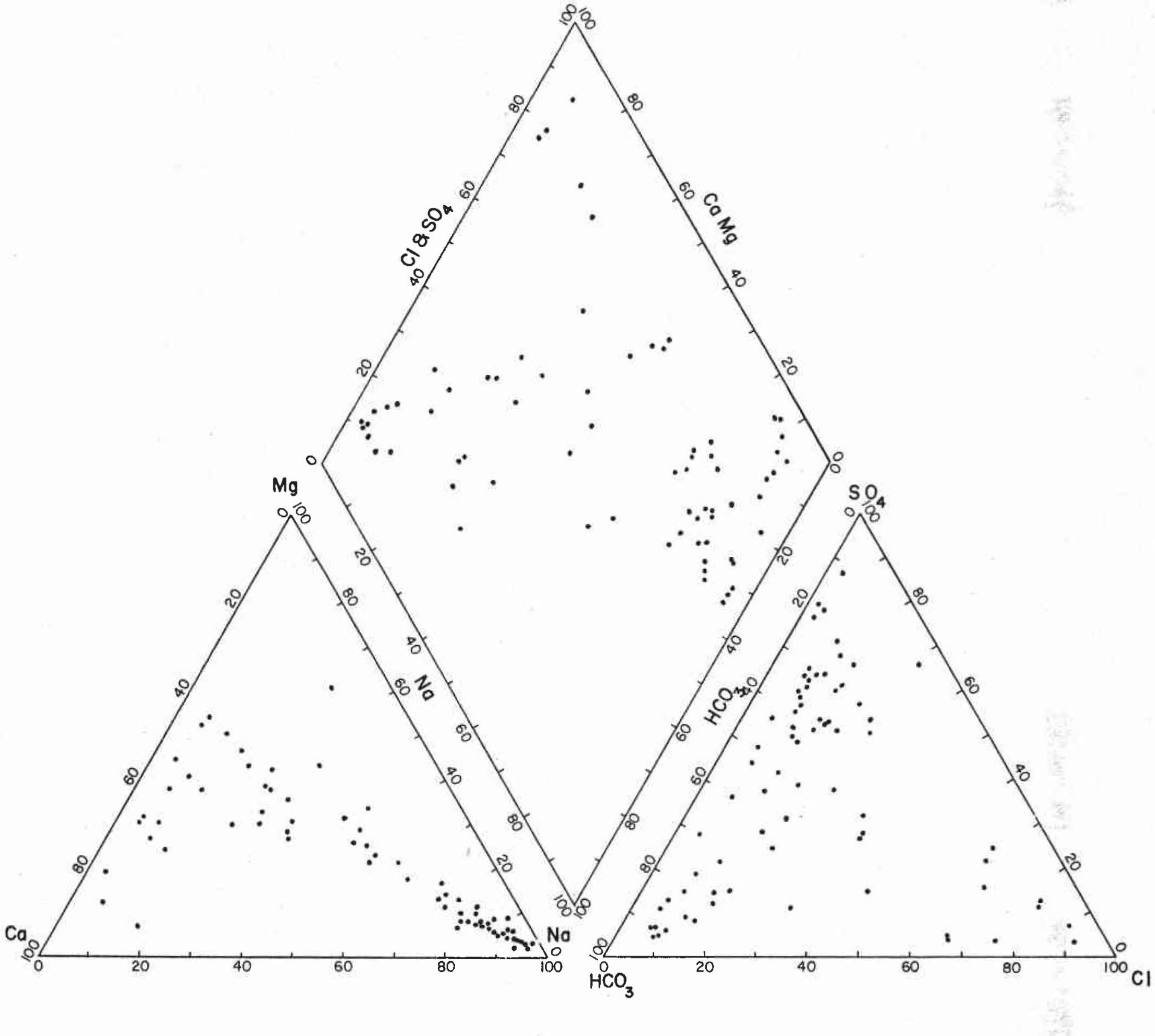


Figure 56. Piper diagram for Hosston ground water--Travis County.

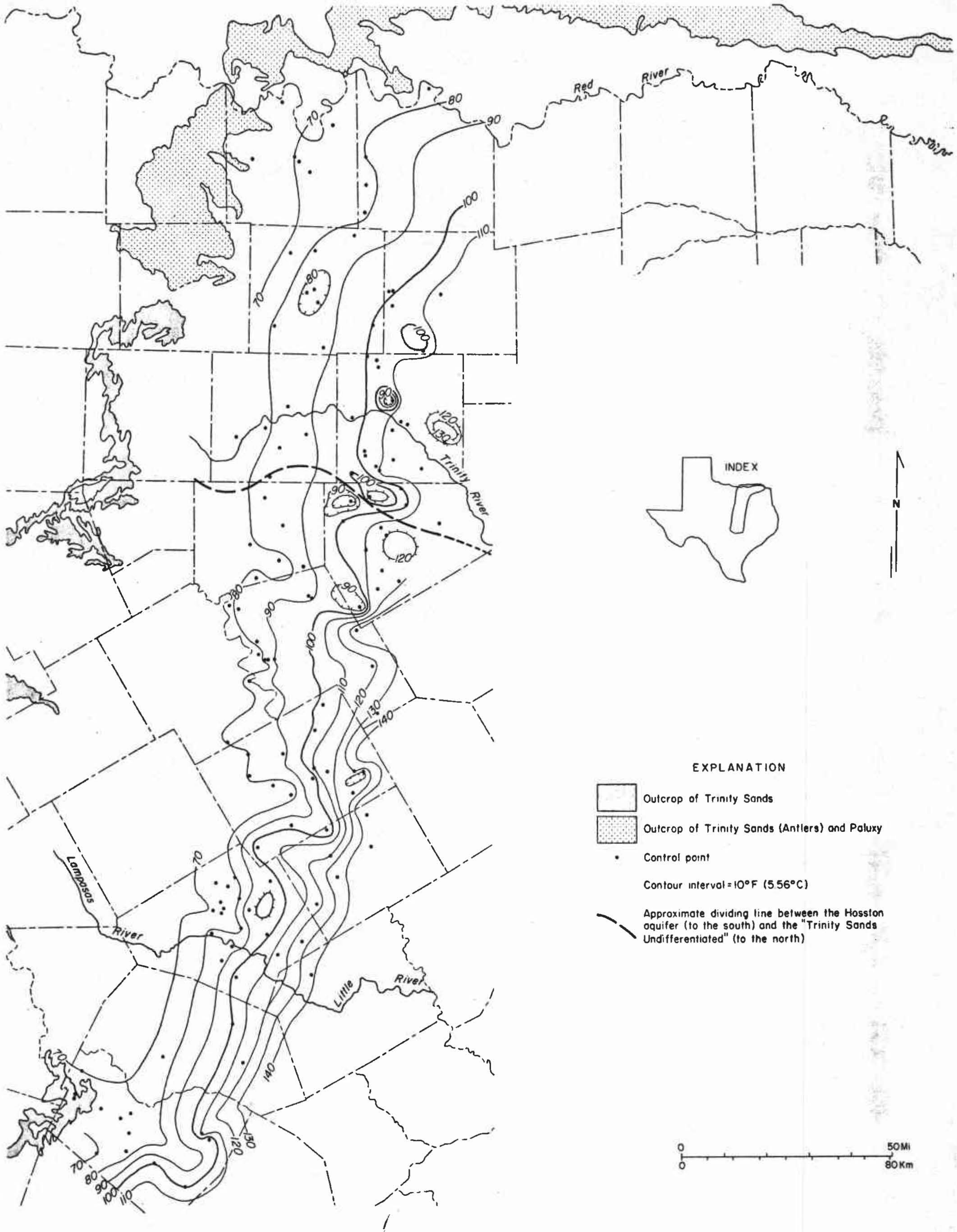


Figure 57. Water temperature contours for Hosston/Trinity aquifer.

Three scatterplots that display temperature versus depth, TDS versus depth, and temperature versus TDS, show some expected and some unexpected relationships when the water data are considered in the aggregate (i.e. in a non-site-specific context). The temperature-depth plot (fig. 58) displays a trend that is expected: it is a positive linear plot that shows the direct relationship between these parameters. The TDS-depth plot (fig. 59) shows that, contrary to expectations, dissolved solids are relatively insensitive to depth; TDS values predominantly trend along the 791 mg/l line, regardless of depth. Many of the anomalies that deviate from this trend are for wells in Travis County, where, as noted previously, contamination may be the cause of the high TDS values. The temperature versus TDS plot (fig. 60) shows the corollary to the other scattergrams; this TDS is relatively insensitive to changes in temperature. In other words, wells that are hotter than usual have satisfactory ranges of dissolved solids. Again, several deviations from this predominant trend occur in Travis County, where contamination may have resulted in low-temperature waters possessing abnormally high dissolved solids.

Geothermal Potential of the Hosston/Trinity

The demonstrated trend whereby water temperatures are shown to increase without a concomitant increase in dissolved solids bodes well for multiple use of the Hosston/Trinity waters for both drinking supply and for geothermal heat production. The geographic extent of this potential is dramatically shown by plotting all localities where Hosston/Trinity waters are tapped for public use, and these localities are compared to the 90^{o} F (32^{o} C) water temperature line and the 1,000 mg/l isopleth (fig. 61). Yet, even in towns that use the waters of higher TDS, the resource potential is still present. The drilling costs and the pumping costs are already borne. The heat is presently wasted.

To illustrate the caloric value of these waters, we obtained municipal water-use records from the Texas Department of Water Resources, and we tabulated mean January ground-water consumption over a five-year period (table 1). A few of these municipal wells have water level and water temperature data on file, and for these we computed energy budgets: debits incurred in lifting the water versus credits obtained from the heat, assuming that the heat would be used for space heating. The City of Taylor, for example, pumps an average of 31,469,800 gal (119,120,000 l) of water every January. Water level is approximately 88 ft (21 m); water temperature is 116^{o} F (47^{o} C); and mean minimum January temperature is 37^{o} F (3^{o} C). Using these figures, we calculate the net energy debit for that month to be 2.96 x 10^{7} Btu (7.46 x 10^{6} kg-cal)

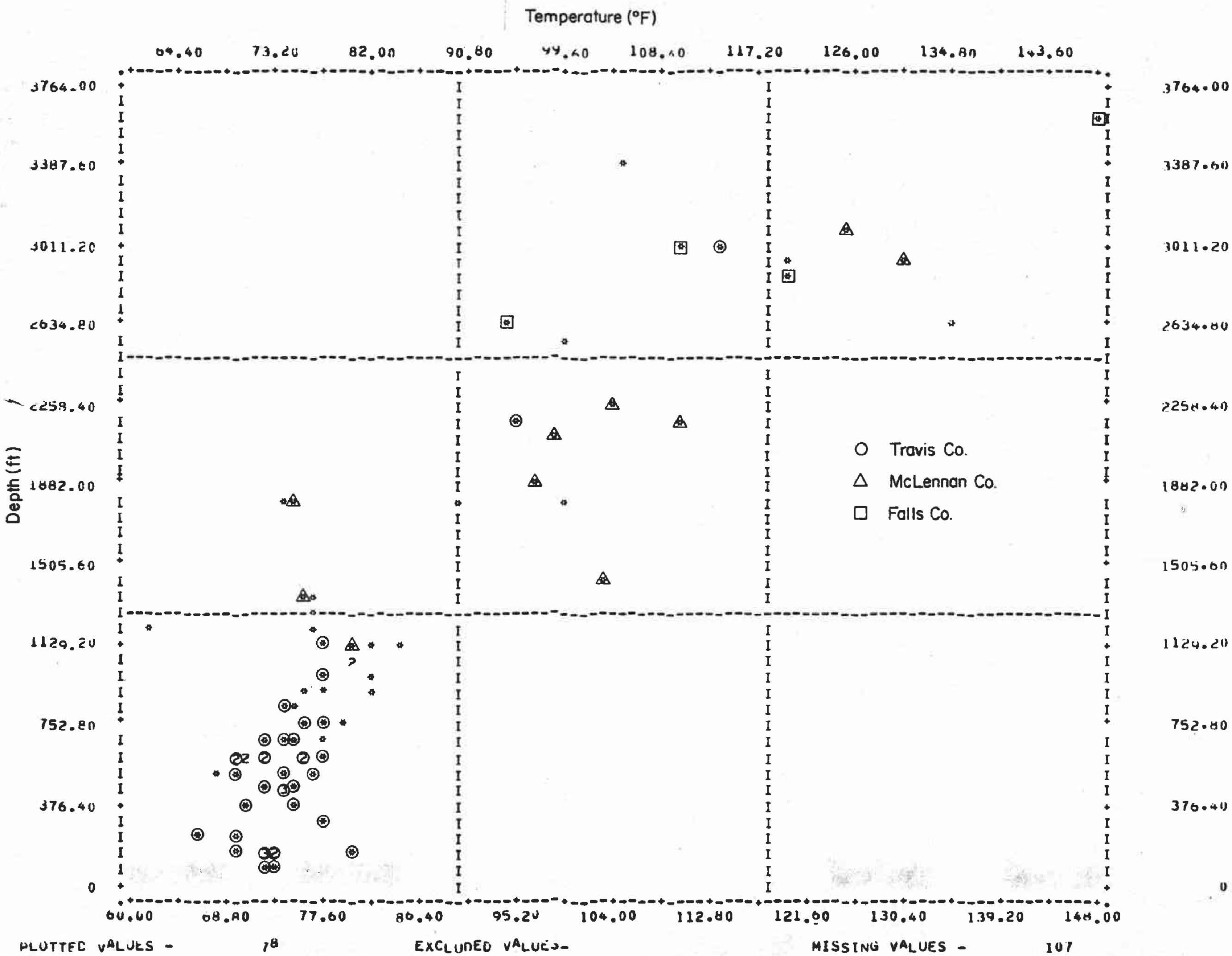


Figure 58. Temperature/depth scattergram for Hosston ground water.

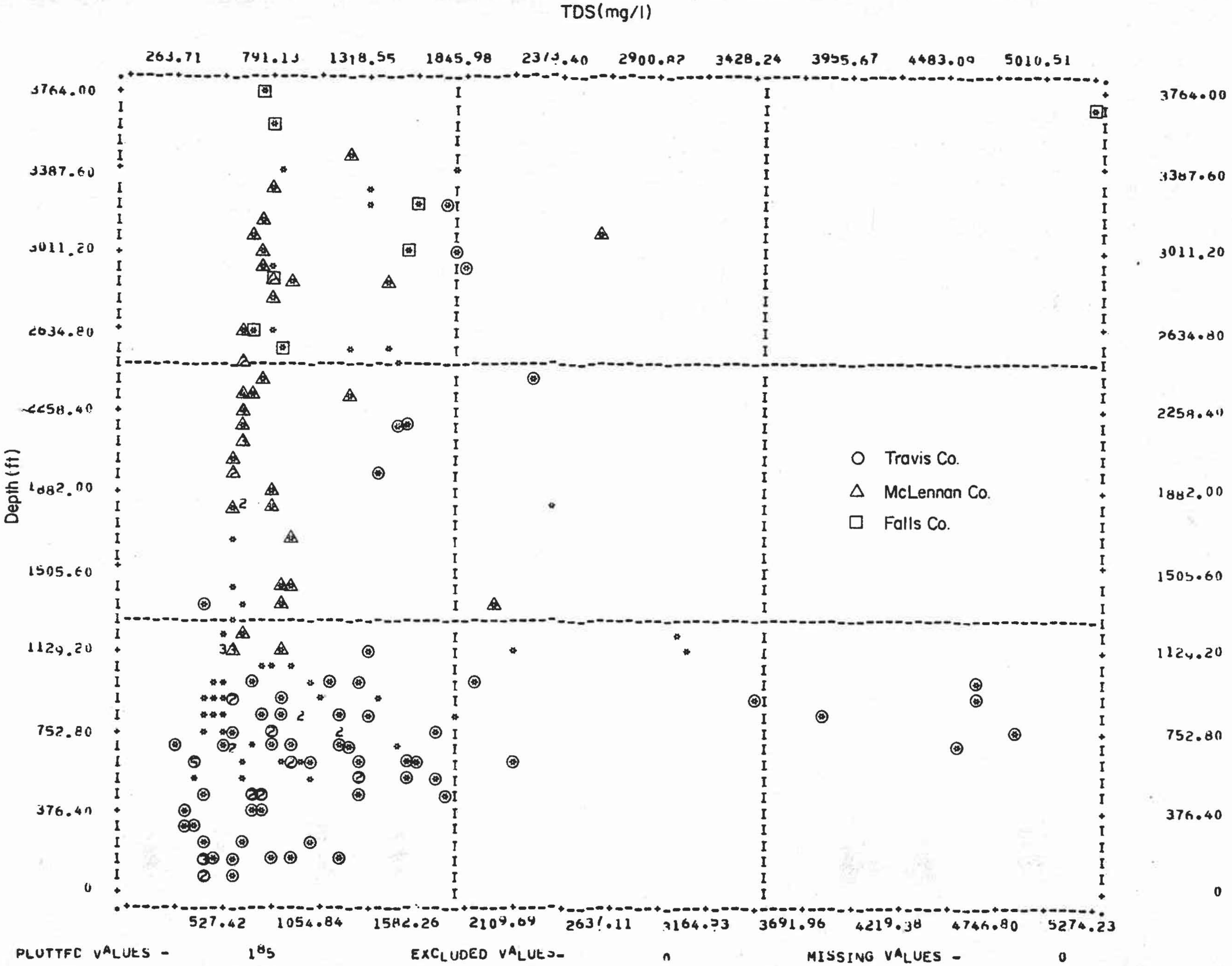


Figure 59. Total dissolved solids/depth scattergram for Hosston ground water.

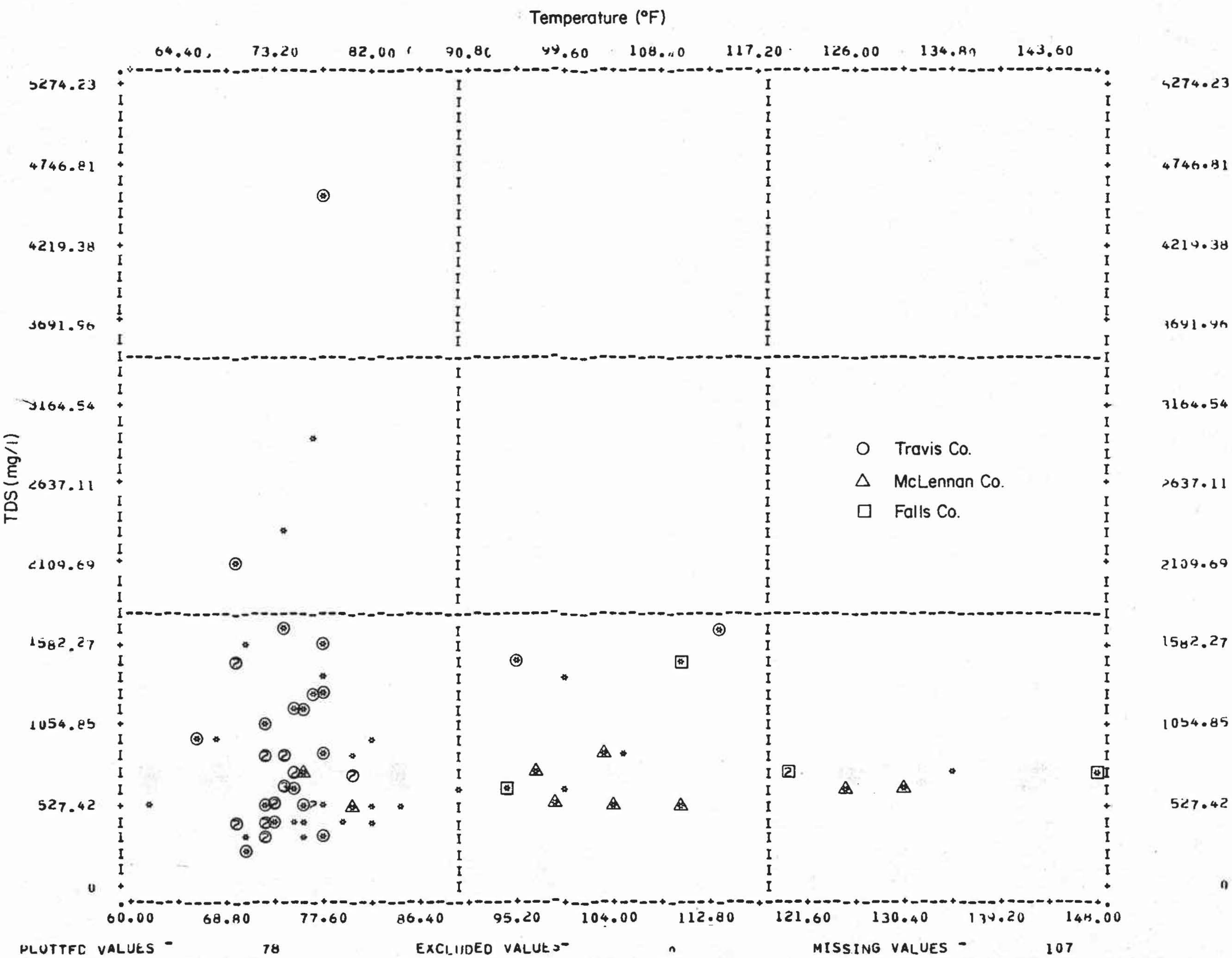


Figure 60. Temperature/total dissolved solids scattergram for Hosston ground water.

Table 1. Selected municipal ground-water withdrawals--Hosston/Trinity undifferentiated (data from Texas Department of Water Resources).

County	Municipality	Mean January Pumpage (1972-1976)	Mean Yearly Pumpage (1972-1976)
Bell	Heidenheimer	289,640	4,301,394
Bell	Holland	1,409,698	19,716,396
Bell	Little River	2,917,400	44,639,775
Bell	Pendleton	1,642,827.5*	19,713,930
Bell	Rogers	2,601,500*	26,545,600
Bell	Temple	195,233*	2,998,466*
Bell	Troy	2,434,370	36,890,730
Collin	Celina ⊕	3,445,420	44,923,840
Collin	Frisco ⊕	7,540,000	102,232,000
Dallas	Addison	5,221,700*	12,395,600*
Dallas	Carrollton	55,200,000*	240,413,000
Dallas	Cedar Hill	13,882,022	197,491,099
Dallas	Coppell ⊕	3,847,733*	35,005,267*
Dallas	DeSoto	35,185,400	496,757,256
Dallas	Duncanville	8,403,600	227,792,000
Dallas	Kleburg	12,576,600	162,383,640
Dallas	Irving	118,542,000*	1,312,432,800
Dallas	Lancaster	26,850,000	367,214,600
Dallas	Wilmer#	5,149,100*	62,371,615
Ellis	Midlothian	9,875,920	131,823,840
Ellis	Waxahachie	1,766,544	25,821,393
Falls	Chilton	741,119*	8,893,430
Falls	Golinda	266,400	5,820,160
Falls	Lott	1,419,890*	18,272,884
Falls	Perry	370,294	5,320,039
Falls	Satin	184,401*	2,212,813*
Hill	Abbott	1,200,000	14,841,960
Hill	Aquilla	245,270	3,638,030
Hill	Blum	737,020	11,687,690
Hill	Covington	2,030,503	19,563,929
Hill	Hillsboro	32,007,000	426,805,800
Hill	Hubbard	5,163,627*	58,816,390*
Hill	Itasca⊕	6,124,600	90,406,484
Hill	Malone	719,707	8,719,397
Hill	Mt. Calm	811,460	10,316,460
Hill	Penelope	213,360*	3,686,132
Hill	Whitney	4,283,060	61,898,420
Limestone	Prairie Hill	2,019,730	22,483,275

* indicates less than 5 years of measurements
\# draws from both Hosston/Trinity and Paluxy aquifers
⊕ draws from both Hosston/Trinity and Woodbine aquifers

Table 1. (cont'd)

County	Municipality	Mean January Pumpage (1972-1976)	Mean Yearly Pumpage (1972-1976)
McLennan	Axtell	887,208	10,646,496
McLennan	Bellmead	16,168,600	211,718,200
McLennan	Bruceville	405,448	6,041,252
McLennan	China Spring	298,400	4,774,600
McLennan	Crawford	989,468*	15,484,669
McLennan	Eddy	862,944	14,684,186
McLennan	Elm Mott	2,958,160	36,284,875
McLennan	Hewitt	3,482,100	55,763,620
McLennan	Lacy-Lakeview	11,006,660	145,753,420
McLennan	Leroy	831,200	12,187,200
McLennan	Lorena	1,505,060	21,402,424
McLennan	Mart	11,111,280	136,609,944
McLennan	McGregor	15,609,480	200,292,352
McLennan	Moody	2,355,920	27,840,520
McLennan	Riesel	2,320,412	24,617,852
McLennan	Robinson	9,078,400	133,075,000
McLennan	Ross	1,750,000*	26,256,344
McLennan	Waco	7,410,550*	53,314,650*
McLennan	West	7,420,800	102,980,800
McLennan	Woodway	10,999,667*	225,275,180
Milam	Buckholts	565,400*	7,908,625*
Travis	Austin	912,500*	10,950,000*
Travis	Jonestown	957,103*	11,485,239
Travis	Manor	2,161,560*	23,053,508
Williamson	Andice	83,719*	1,004,623
Williamson	Bartlett	3,310,340	44,420,656
Williamson	Florence	2,065,340	29,618,860
Williamson	Granger	6,220,600	97,266,200
Williamson	Jarrell	1,419,460	22,533,860
Williamson	Liberty Hill	1,295,413	18,310,301
Williamson	Taylor	31,469,800	421,969,000

* indicates less than 5 years of measurements
# draws from both Hosston/Trinity and Paluxy aquifers
• draws from both Hosston/Trinity and Woodbine aquifers

and the energy credit to be 2.07×10^{10} Btu (5.22×10^{9} kg-cal). Given the prevailing (conservative) price of \$$2.5 \times 10^{-6}$ per Btu (\$$9.9 \times 10^{-6}$ per kg-cal), we see an asset worth up to $51,750 during a single "average" winter month.

These dollar values are probably overstated because we did not attempt to account for efficiencies of heat-exchange systems. In other words, the values presented here reflect the total heat available during one specific month; the actual usable heat content obtainable may be less by approximately 50 percent owing to efficiencies of heat exchange systems (Marshall Conover, personal communication, 1979). Also, the temperature differential is probably somewhat high, as we computed our values using the long-term January mean minimum temperature. However, for that part of the water used for water heating, the ambient air temperature is irrelevant and the caloric value as computed could be applied to domestic or industrial hot water demands. This is of no mean consequence, since water heating accounts for approximately 40 percent of domestic energy use (Ray Tessmer, personal communication, 1979). For domestic wells, a few simple plumbing modifications can make this resource a viable option for many homes throughout the region.

The resource potential as computed and as shown in figure 61 is for areas that presently produce Hosston or Trinity ground water. There are, however, other areas having geothermal potential on the basis of our regional geologic assessment. The most evident unexplored area is the deep, high net-sand trends associated with the deep fluvial and deltaic systems of the Hosston/Trinity in Bowie, Red River, Morris, Titus, Franklin, Lamar, and Hopkins Counties. Water quality from similar depositional systems in the shallower Paluxy Sand indicates that these deep Trinity waters would probably present water quality problems; but there is a clear potential for use of the Trinity waters, and it warrants further study.

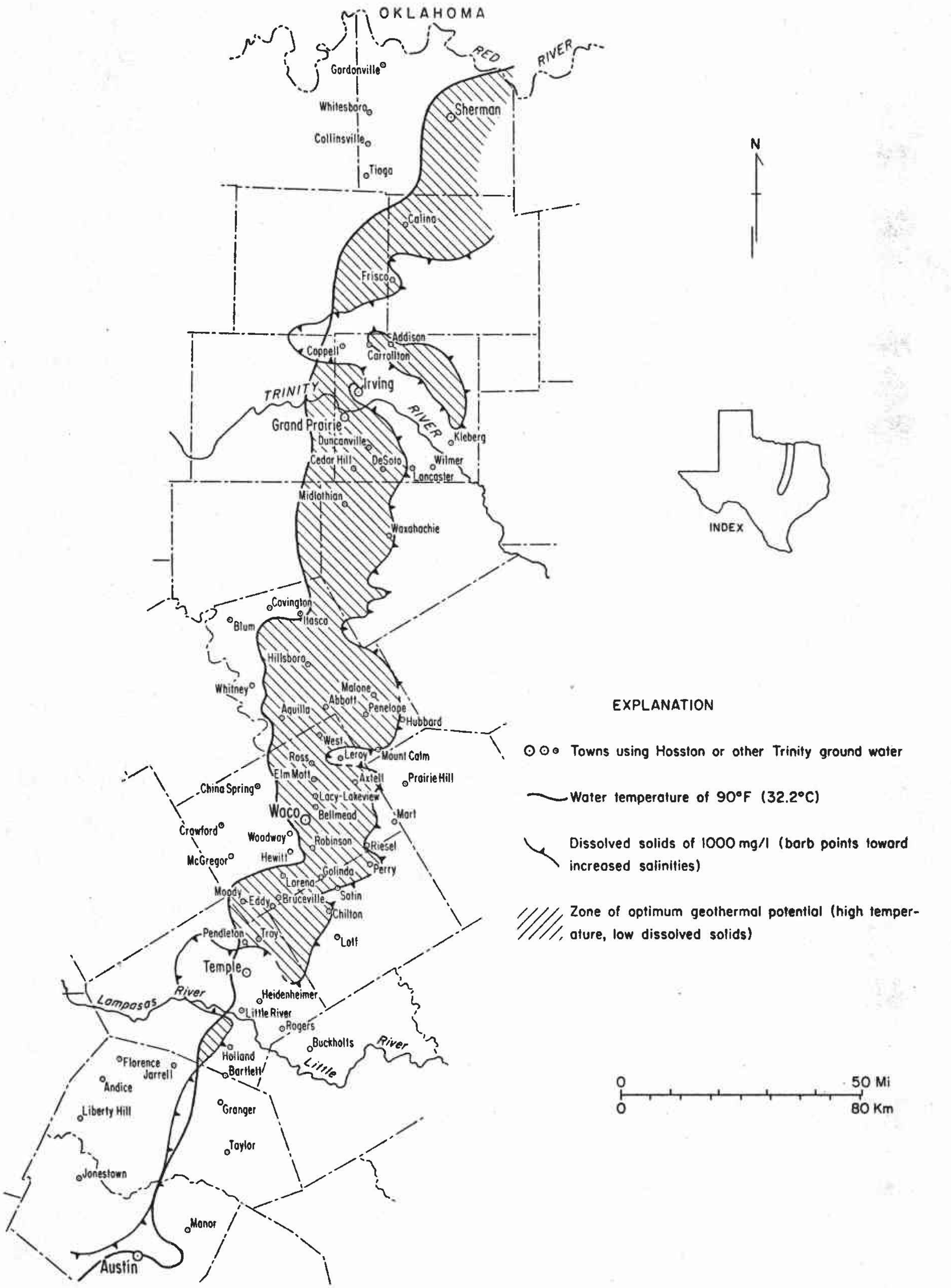


Figure 61. Municipalities using Hosston/Trinity ground water compared to areas of optimum geothermal potential.

HENSEL SAND

General

The Hensel Sand is the uppermost of the Trinity sands in the area south of the Trinity River. It represents a depositional environment similar to that of the Hosston, but it is neither as areally extensive nor as thick as the Hosston. The downdip limits of the Hensel are marked by facies changes to mud and limestone deposits of the Pearsall Formation in south-central Texas (Loucks, 1976), and to the Rodessa Limestone farther north in Central Texas. The northern limit is the arbitrary (nomenclatural) boundary with the Trinity Sands Undifferentiated that occurs near the Trinity River. North of that line, the Hensel is equivalent to one of the many stacked, undifferentiated Trinity Sands (fig. 13).

Thickness of the Hensel

The isopach map (fig. 62) of the Hensel Sand is drawn from Hays County north into Ellis and Johnson Counties; only sparse data were available in Hays, Blanco, and Comal Counties, hence a coherent isopach or net-sand picture could not be drawn across the entire areal extent of the Hensel aquifer. The areas included on this map, however, encompass the entire reaches of (modest) geothermal potential in the Hensel.

The Hensel "signatures" on electric logs indicate that the unit is dominantly terrigenous sand (figs. 14 and 17). Hence, the isopach map is essentially a net-sand map. This assumption is corroborated by the close parallel of geometry and thickness of isopachous lines to net-sand thicknesses of Hensel sand bodies as mapped by Hall (1976). The main deviation occurs where the sands appear to be thickening basinward in the central part of the study region. This probably indicates the interfingering of part of the Rodessa lime facies (fig. 36), and thus the inclusion of both limestone and sandstone beds in these isopach values.

The Hensel, like the Hosston, represents a series of Cretaceous fluvial and deltaic systems trending from west to east off the Texas Craton in the area delineated on the isopach map. Farther to the southwest, in Gillespie, Kerr, and Bandera Counties, the Hensel probably consisted of a series of small fluvial systems coursing off the Llano area a few miles to the north.

Because the Hensel terrigenous deposits were derived from smaller or shorter-lived fluvial systems, they did not prograde as far east as did the Hosston fluvial and

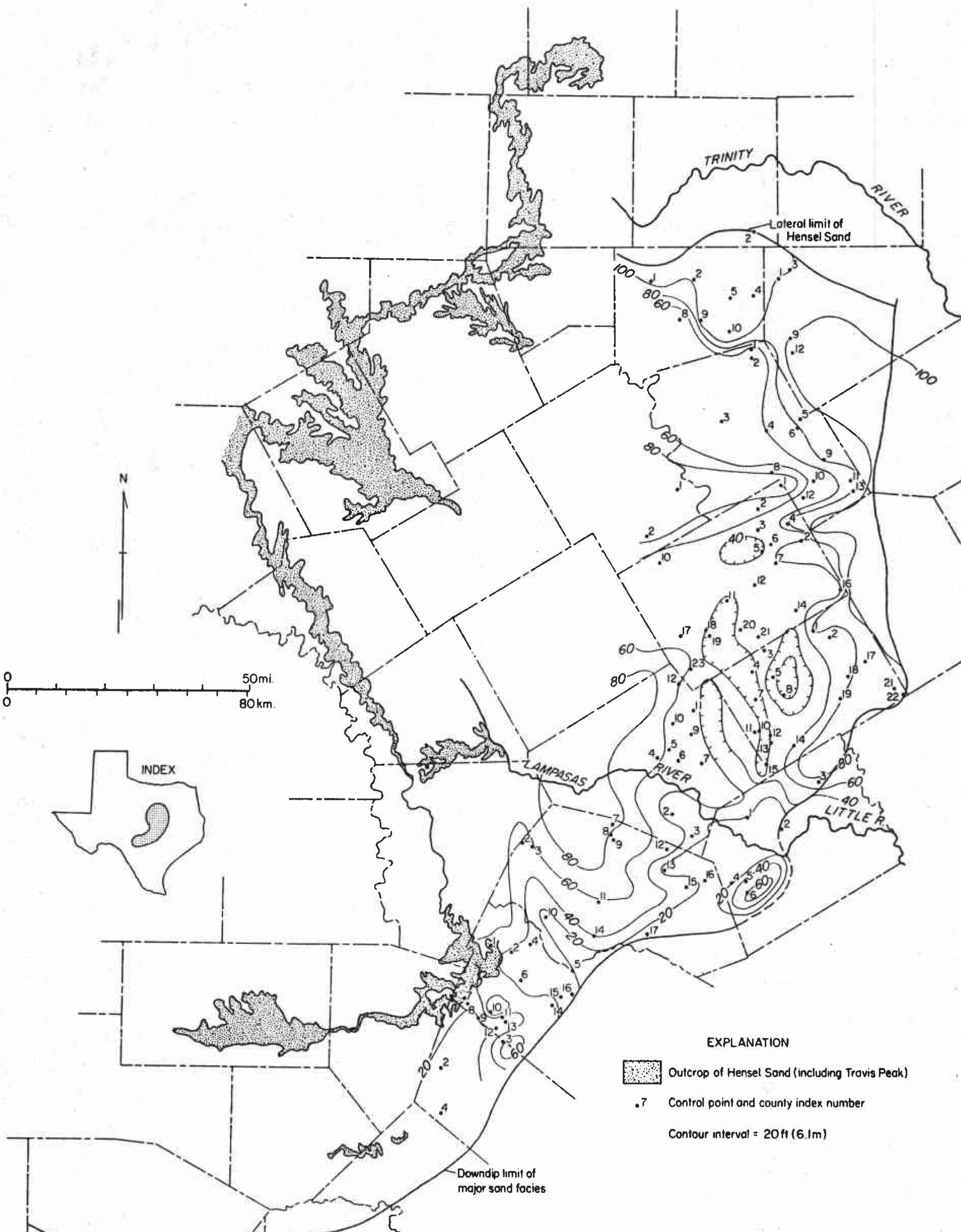


Figure 62. Isopach map of Hensel Sand.

deltaic systems. Like the Hosston, though, the fluvial deposits terminated in a series of small wave-dominated deltas (Hall, 1976). Also there are apparent offshore bar deposits as seen in Milam County; however, these relatively thick deposits may be carbonate sands, and might be similar to the subtidal and intertidal marine and lagoonal systems of the Hosston, such as those described by Bebout (1977).

Structural Configuration of the Hensel

We mapped the structural features of the Hensel Sand (fig. 63) only for those areas where net sands are sufficiently thick for the unit to be a potentially viable geothermal aquifer. There, the structural configuration of the top of the Hensel is similar to that of the Hosston (fig. 52). Dips of Hensel beds range from approximately 10 ft/mi (2 m/km) in Kerr and Kendall Counties to more than 120 ft/mi (23 m/km) in Falls County. As with the Hosston, the structural hinge zone is clearly seen at the locus of increased dip.

Normal faults that displace the Hensel are fewer than those displacing the Hosston; in almost every instance, however, faults seen on the Hensel map also affect the Hosston. This reduction of fault traces upward in the section may be due to (a) growth faulting during deposition of the Hosston or (b) upward propagation of some faults that displace subjacent Paleozoic rocks. Fault displacement is of generally the same magnitude for both the Hosston and the Hensel; the stratigraphic offset ranges from approximately 100 to 300 ft (30 to 90 m), and displacement is most commonly mapped at about 100 ft (30 m).

General Aquifer Properties of the Hensel

The Hensel Sand is an aquifer that serves mainly for domestic purposes and livestock watering (Klemt and others, 1975). Most of this water use is in the updip reaches of the aquifer, in the areas closest to recharge zones and where the sands occur in well-defined fluvial trends. Hence, most of the areas where the Hensel aquifer is used extensively are areas of moderate water temperature values, approximating mean annual air temperatures of the recharge zones. Many of the areas where the Hensel is heavily drawn upon lie outside the region studied here (notably west of Bell, McLennan, and Hill Counties in the central part of our study region); another area where the Hensel is used extensively is in Kendall, Kerr, and Bandera Counties, but in both areas the aquifer temperatures approximate mean annual air temperature values. In neither area does the Hensel show promise as a geothermal resource.

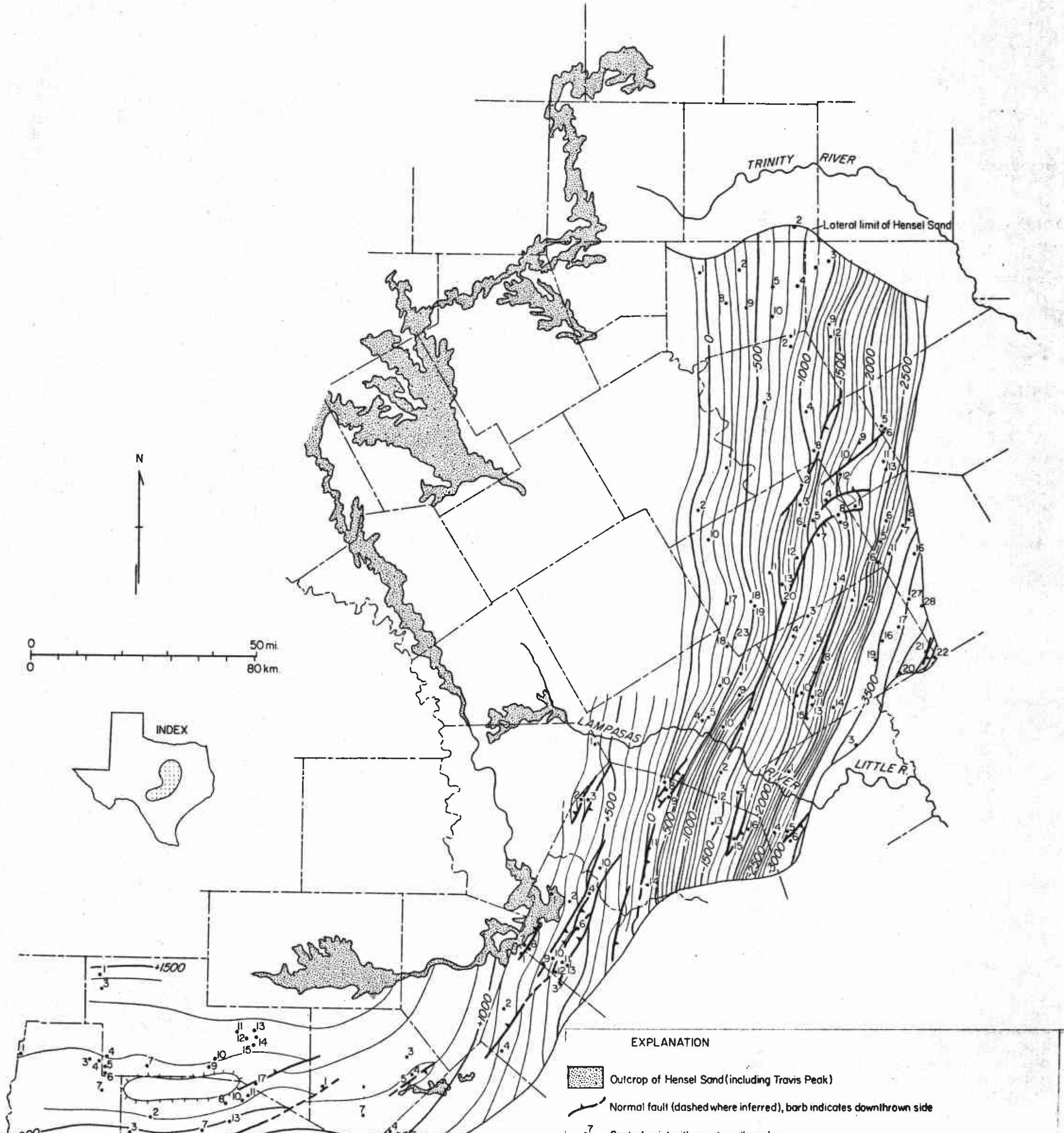


Figure 63. Structural configuration of Hensel Sand.

In the downdip parts of the Hensel aquifer--in the locality where geothermal waters would be expected--facies changes abruptly modify the lithic character of the host rock. There are, however, a few data points in Travis, Bell, and McLennan Counties (fig. 64) indicating that waters from the Hensel exhibit temperatures greater than 90° F (32° C). These values, however, occur near the downdip terminus of the Hensel Sand, in areas of expected low aquifer productivity and high dissolved solids.

In summary, the Hensel aquifer is attenuated in its downdip reaches, and thus, its aquifer potential is severely limited in those areas where elevated temperatures might occur. For this reason, the Hensel does not appear to be a viable source of low-temperature geothermal waters, except perhaps at a few scattered localities.

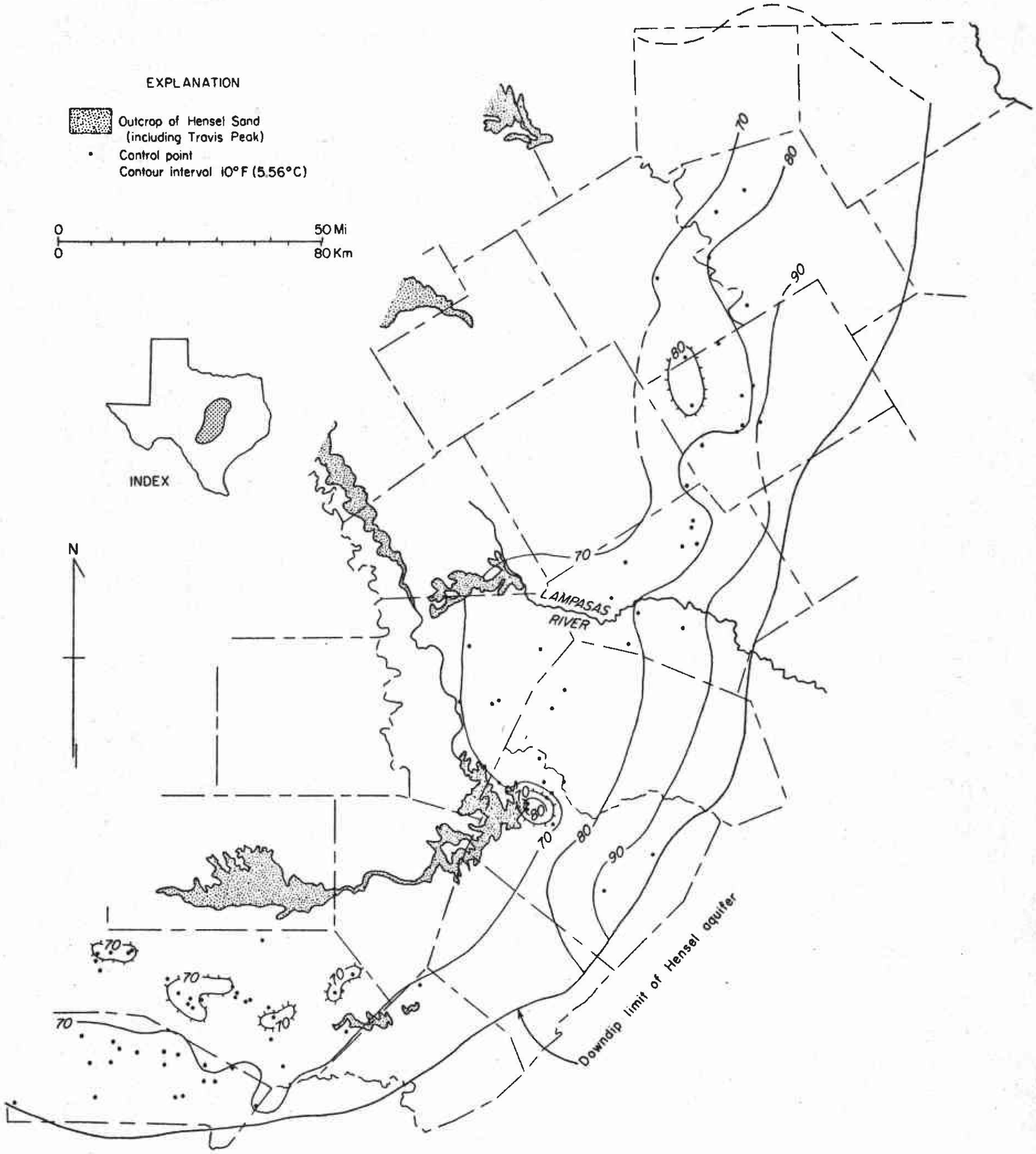


Figure 64. Water temperature contours for Hensel Sand.

PALUXY SAND

General

The Paluxy Sand is a terrigenous sandstone unit that was deposited in the northern part of the Gulf coastal province (the East Texas Basin) mainly from fluvial and deltaic systems coursing off the Ouachita and Arbuckle highlands. The Paluxy Sand thins toward the south, where its marine strandplain and offshore bar sand facies thin to a feather edge. There mud deposits and marl become progressively thicker, and these deposits in Central Texas make up the limestones and marls of the Walnut Formation. In the northwesternmost part of the study region (in Grayson County) the Glen Rose Limestone, which normally separates the Paluxy from the basal Trinity Sands, terminates. North of the limit of Glen Rose deposition, the Paluxy Sand is indistinguishable from the Trinity Sands Undifferentiated unit; in that area, the Paluxy is considered part of the Trinity (see figs. 12 and 41).

Net-Sand Distribution of the Paluxy

On the northeastern margin of the East Texas Basin, the Paluxy net-sand trends suggest a major delta system that prograded into the basin from the north and northeast. There, aggregate sand thicknesses of more than 400 ft (122 m) form the delta lobes; there are, however, no clear indications of thick strike-oriented sand bodies, such as those composing the offshore bars or delta-front sands distal to the subjacent Trinity delta system. All the Paluxy delta systems are probably wave-dominated, and Caughey (1977) corroborates this major delta trend. He also reported, however, on a coastal barrier facies near the mouth of the main Paluxy deltas in northeast Texas. These barriers are not indicated on our net-sand map, though local thick sand deposits (such as in Kaufman County) suggest possible offshore bars within the larger prodelta-marine shelf system.

Thick, narrow, dip-oriented sand trends with thicknesses as much as 300 ft (91 m) on the net-sand map (fig. 65) indicate that the Paluxy was deposited as a series of locally derived fluvial systems that terminated in fan deltas (fig. 66) on the northwestern margin of the East Texas Basin. Caughey (1977) attributed the Paluxy in this area as being part of a strandplain system; however, the dip-oriented geometry, the proximity to a sediment source, and the similarity to (indeed, coalescence with) basal Trinity fluvial-deltaic systems led us to the conclusion that these deposits are

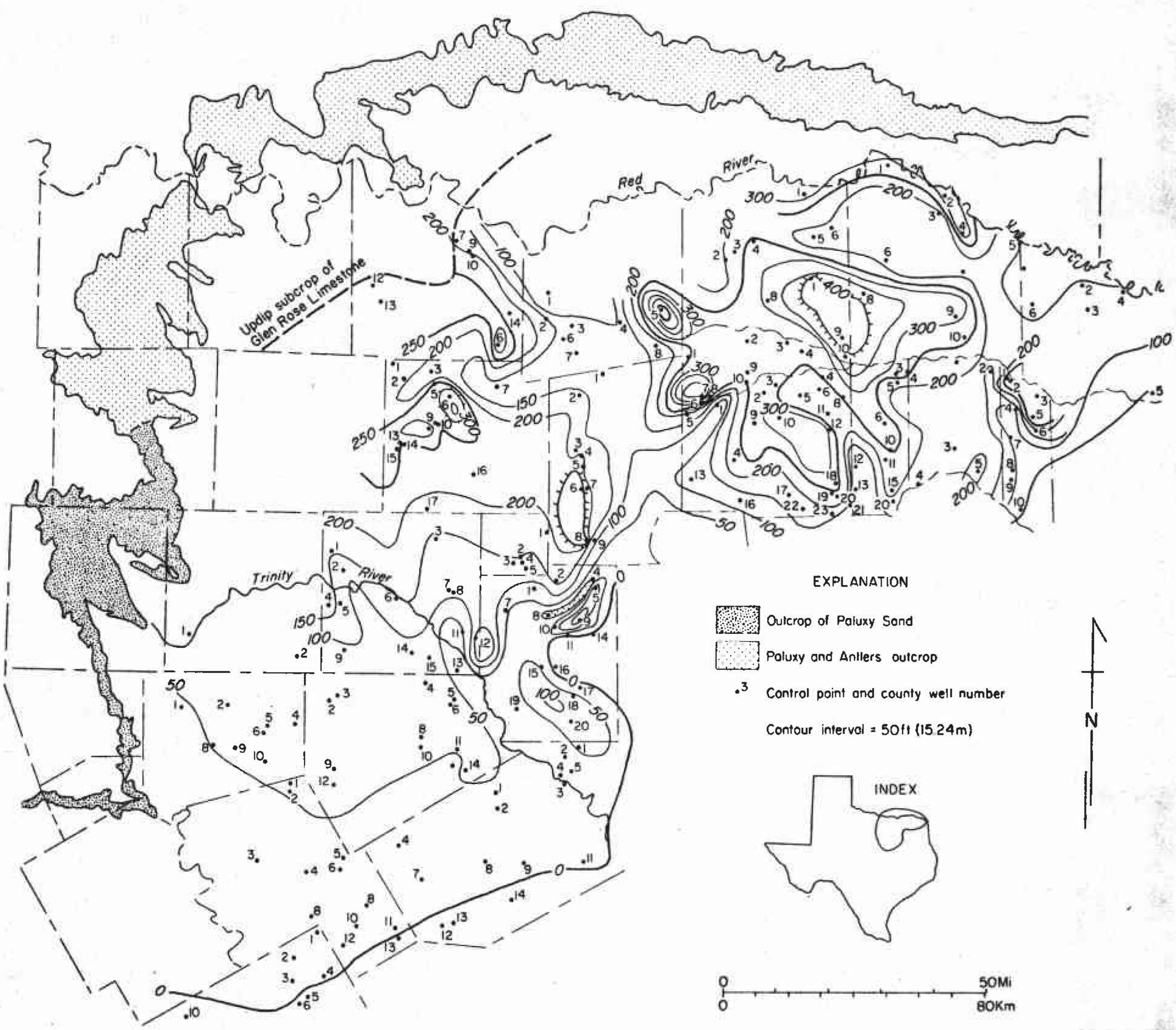


Figure 65. Net-sand thicknesses of the Paluxy.

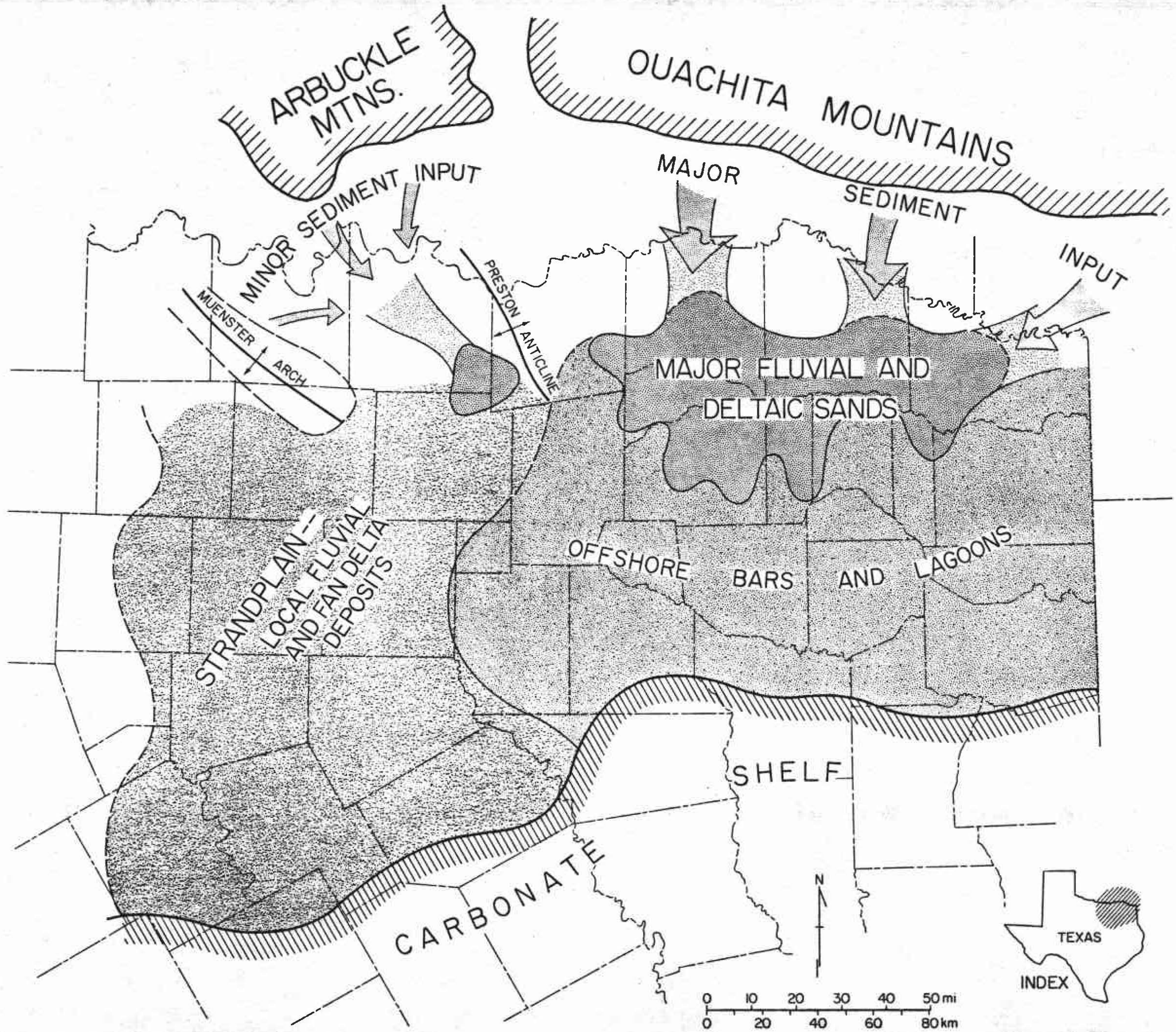


Figure 66. Schematic Paluxy paleogeographic map.

part of a fluvial-fan delta system. Furthermore, work in the outcrop area of the Paluxy in Texas and Oklahoma indicates that the Paluxy Sand there is of fluvial origin (D. Hobday, personal communication, 1979). Clearly, there are probably both dip-fed and strike-fed sand bodies within this part of the Paluxy.

Structural Configuration of the Paluxy

The Paluxy Sand (as with the Trinity Sands below) exhibits marked changes in dip across the structural hinge that separates the Texas Craton from the Gulf coastal province (fig. 67). In its updip reaches in Johnson County, the Paluxy dips range from 30 to 50 ft/mi (up to 10 m/km). Typical dips measured farther into the East Texas Basin are 125 ft/mi (24 m/km); maximum dip values presented here are 160 ft/mi (30 m/km) in Kaufman County.

The change in strike from a northeast-southwest trend to an east-west orientation marks the major embayment noted on both the pre-Cretaceous and the Hosston/Trinity structural maps. This flexure zone is denoted by a normal fault that strikes northwest-southeast and that is displaced down-to-the-west into the Sherman Syncline. But the major faults that displace the Paluxy occur along the Talco Fault Zone, and the northern parts of the Mexia and the Balcones Fault Zones also affect the Paluxy structural setting.

The Talco Fault System defines a narrow graben that trends roughly east-west near the Sulphur River along the Delta and Hopkins county line, and between Red River County and Franklin, Titus, and Morris Counties. Overall net displacement across the fault zone is down-to-the-coast; stratigraphic displacement along the northern part of the graben is commonly more than 1,000 ft (300 m), whereas up-to-the-coast displacement at the southern extremity of the graben is generally no more than 700 ft (213 m). However, in Hopkins County, at the western limit of the Talco system, up-to-the-coast displacement is as much as 1,300 ft (395 m), which is approximately equal to maximum down-to-the-coast displacement. The geometry of faulting in the Talco Fault Zone is similar for both the Paluxy and the Hosston. However, down-to-the-coast displacement is somewhat more for the Hosston. Up-to-the-coast displacement is roughly equivalent for both horizons.

The north-south-trending Mexia Fault Zone extends into Kaufman and Hunt Counties. There, up-to-the-coast displacement of the Paluxy is approximately 250 ft (75 m). Farther south, in Henderson and Navarro Counties, the strike of individual faults changes to more of a northeast-southwest direction, and there the down-to-the-

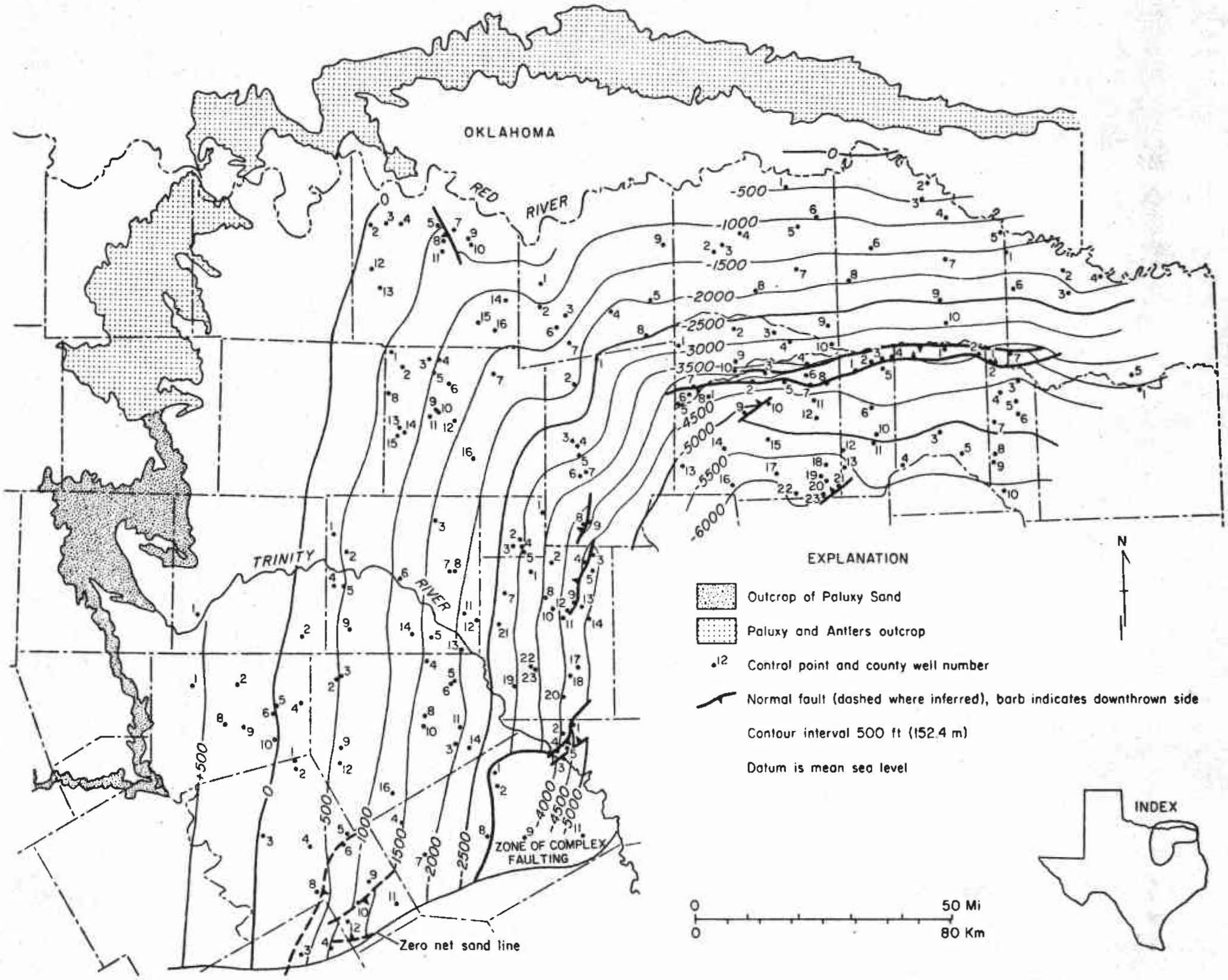


Figure 67. Structural configuration of the Paluxy.

coast displacement is approximately 250 ft (75 m), whereas up-to-the-coast displacement is no more than 200 ft (60 m).

The northernmost extension of the Balcones Fault system displaces the Paluxy in Hill County; there stratigraphic offset is approximately 275 ft (84 m) in a down-to-the-coast direction.

General Aquifer Properties of the Paluxy

Examination of data on water level, water quality, and water temperature demonstrates a pronounced discontinuity in the Paluxy aquifer in that there is a western set of wells clustered in Denton, Collin, Tarrant, Dallas, and Johnson Counties, and an eastern cluster of wells in Hunt, Delta, Lamar, and Red River Counties. The dissimilarity of data between these two areas indicates that two Paluxy aquifers exist in two distinct geologic settings. The western Paluxy aquifer occurs in an area of sparse lithic control, but its geologic setting appears to be the sands distal and marginal to the locally derived fan-delta systems, and the marine strandplain-shelf sands of Caughey (1977). A net-sand low of less than 100 ft (30 m) separates the western Paluxy aquifer from the eastern Paluxy aquifer. There are few water wells in our data base that penetrate the Paluxy across this sand "divide" separating the two distinct aquifers. The eastern aquifer taps sands that compose the distributary-channel sands of the delta system that trends into the basin from the north and northeast.

Water Level of the Paluxy

The water level map for the Paluxy (fig. 68) is based on data collected by the Texas Department of Water Resources during November 1977. These contours approximate the potentiometric surface of the aquifer, and thus, they can be used to predict flow paths. In western Tarrant County, one well occurs in the outcrop area of the Paluxy, where the aquifer is under water table conditions. East of the outcrop area, the structural contours dip basinward at a rate twice as high as that of the dip of water level contours. Hence, in most of the area contoured, the Paluxy aquifers are under artesian conditions in which water levels rise as much as 2,000 ft (610 m) above the top of the aquifer host rock in Rockwall County.

Strike of the water level contours are approximately parallel to structural strike near the Paluxy outcrop, but this situation changes in Dallas and Collin Counties. There, water level contours encircle the Dallas metropolitan area, probably in response to extensive pumping in eastern Tarrant and western Dallas Counties.

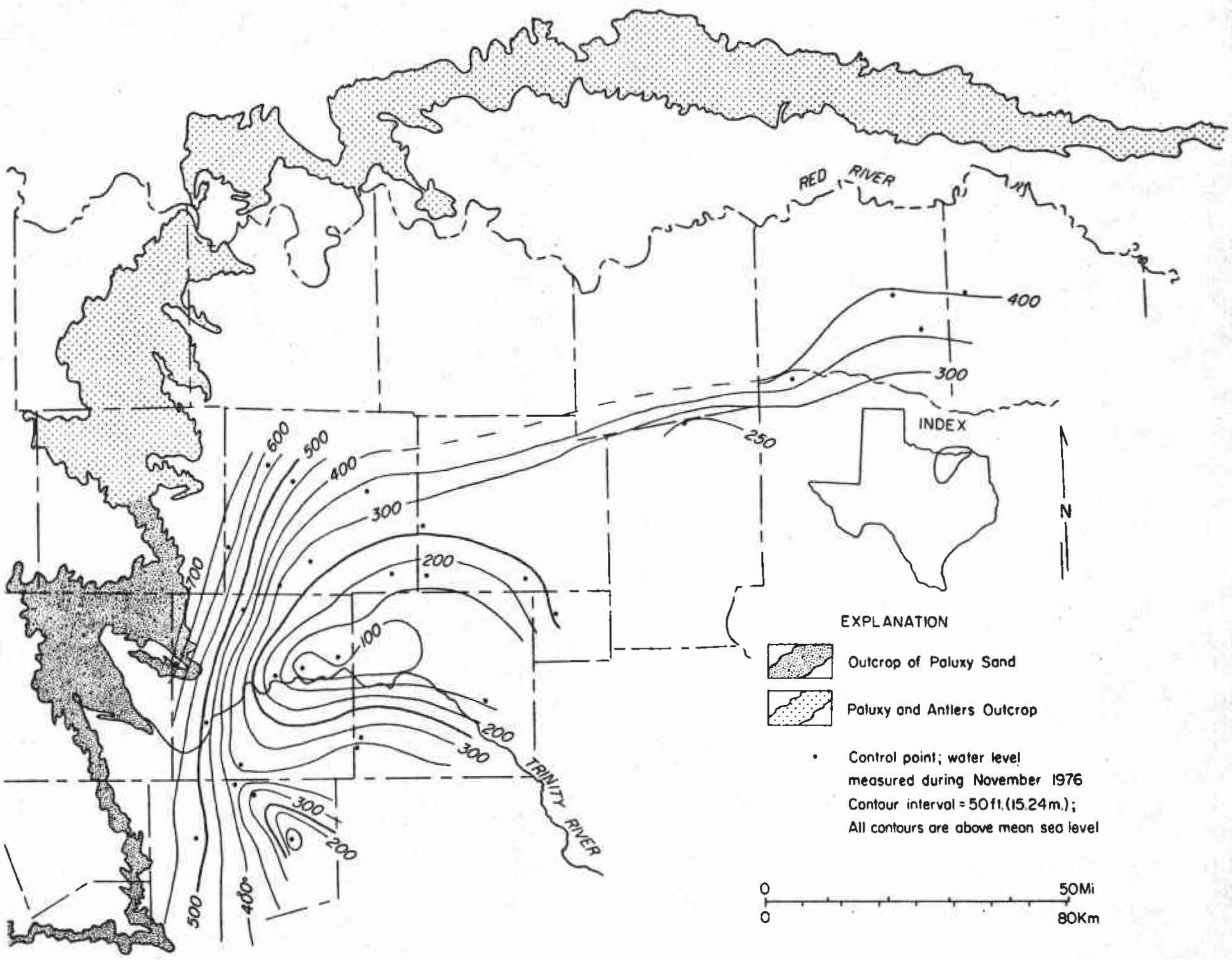


Figure 68. Water level contours for the Paluxy.

Another factor affecting the change in strike of the water level contours in Collin County is the presumed presence of the ground-water divide separating the two Paluxy aquifer systems along the zone of thin net sands. Another localized closure of water level contours is seen in eastern Johnson County, and this probably results from extensive pumpage in the vicinity of Alvarado, a community lying in the center of this cone of depression.

In the eastern Paluxy aquifer, the water level contours trend in the same general strike directions as the Paluxy structural contours, but data points are not sufficiently close to denote possible cones of depression there. The structural dip in Lamar County is approximately ten times the inclination of the water level surface, and this difference results in ground water rising more than 2,200 ft (670 m) under pressure. Depths to the "static" water level in Lamar and Red River Counties is no more than 165 ft (50 m), yet the aquifer in that area lies at a depth of commonly more than 2,000 ft (610 m).

Water Quality and Water Temperature of the Paluxy

The map depicting TDS content of Paluxy ground water clearly shows the discontinuity between the eastern and western Paluxy aquifer systems (fig. 69). Along the ground-water divide in Grayson, Hunt, eastern Collin, and western Fannin Counties, there are no water quality data—probably because of a paucity of water wells there. In the western Paluxy aquifer, data points are more numerous than in the eastern system, and ground water in the updip reaches is of a higher quality compared with water from wells across the ground-water divide.

Most wells in Tarrant and Denton Counties have dissolved solids values of less than 750 mg/l, whereas all wells in Lamar, Delta, and Red River Counties have values of more than 1,000 mg/l. This can be partly explained by the fact that the Paluxy lies beneath Tarrant and Collin Counties at a shallow depth--only a few hundred feet beneath the ground surface—whereas the wells in Lamar County penetrate the aquifer at depths of more than 1,500 ft (455 m). More important for water quality, however, is the presence of dip-oriented fluvial sand channels that provide direct hydrologic communication with a recharge area in the western part of the aquifer. In the eastern part of the Paluxy, the Red River probably acts as a hydrologic base level. Further, even though the Paluxy is not exhumed, the Red River nonetheless probably diverts meteoric waters flowing downdip from the recharge area in Oklahoma. In short, the eastern Paluxy aquifer is recharged along its depositional trend--both from the east

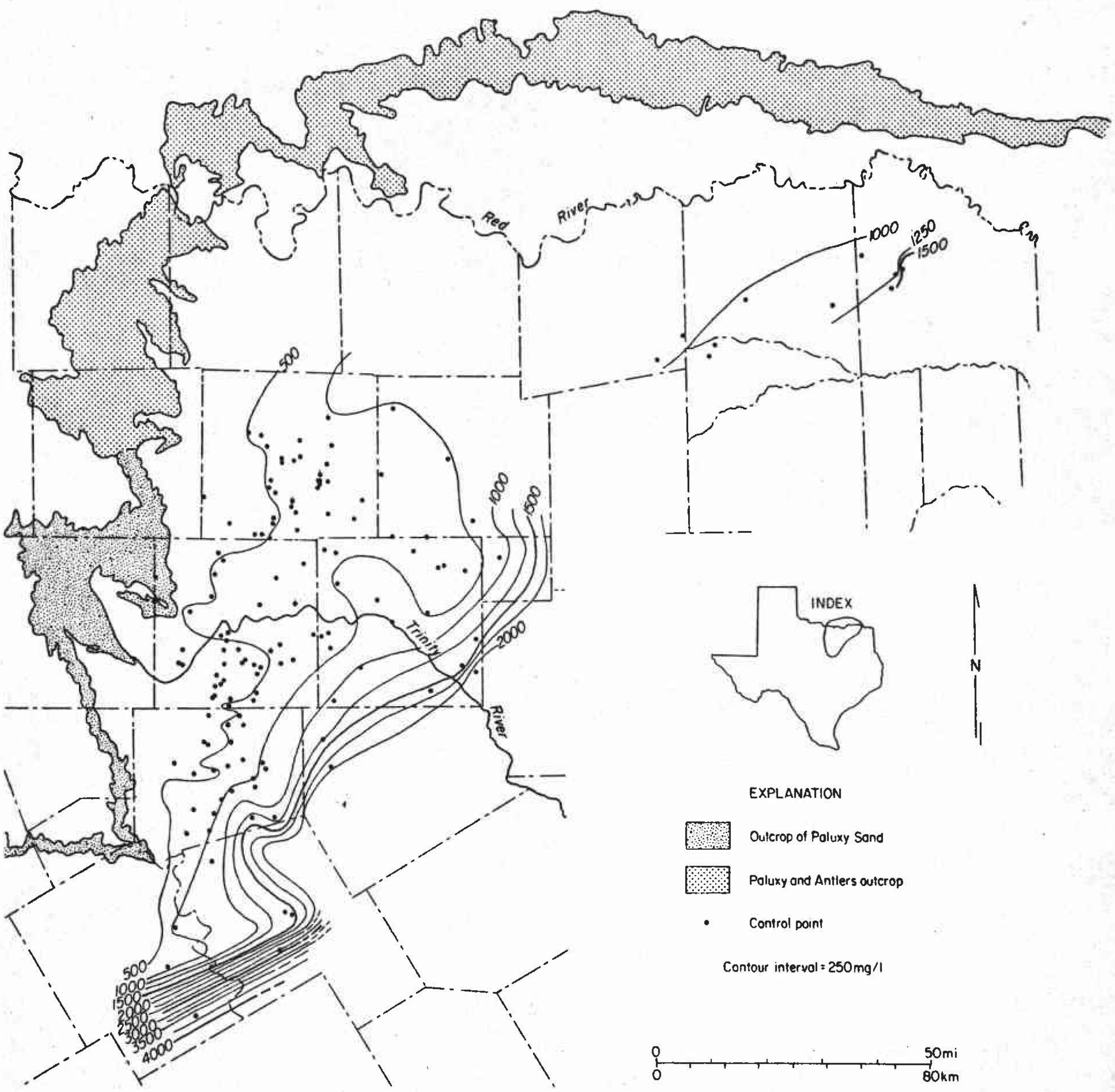


Figure 69. Total dissolved solids contours for Paluxy ground water.

and from the north. But since flow lines probably converge toward the Red River, the result is less recharge and a lower quality of ground water in this part of the Paluxy.

In all instances, water quality correlates directly with thick sand bodies; zones of thick sand generally display relatively low TDS values. This is true for the deep delta lobes in the eastern part of the Paluxy; water quality is better there (lower TDS) than for areas of equivalent depth (but of lower thickness of net sands) in the western part of the aquifer. Similarly, as the net sands of the aquifer thin to the south, water quality becomes progressively worse, and this is most dramatically seen near the zero net-sand line in Bosque and Hill Counties, where dissolved solids content of the water increases precipitously.

Ground-water temperature, like the other aquifer attributes, clearly delineates the two distinct hydrologic areas within the Paluxy Sand (fig. 70). In the western part, temperatures are mostly less than 90° F (32° C); whereas in the eastern area the three wells, for which temperature data exist, are all above 110° F (43° C).

Temperature isopleths, as expected, trend parallel to structural strike, and water temperature increases with increasing depth. The temperature/depth relation is further substantiated by a scattergram of all Paluxy water data (fig. 71). The Paluxy TDS values increase only moderately with increasing depth (fig. 72), although the increase in TDS is somewhat greater than that charted for the Hosston/Trinity. Nonetheless, a comparison of temperature to TDS (fig. 73) indicates that geothermal potential exists for many localities within the Paluxy because there are several wells producing water at greater than 100° F (38° C), but which have dissolved solids concentrations low enough for the water to be potable.

Geothermal Potential of the Paluxy

There are only a few localities where the Paluxy is used for public water supply (table 2); it is, like the Hensel Sand, commonly used to supply domestic and livestock needs. However, there are two localities--one in the Dallas metropolitan area in the western part of the Paluxy aquifer system and one in Fannin and Lamar Counties in the eastern part—where the geothermal potential is indicated by water temperature values greater than 90° F (32° C) and dissolved solids content less than 1,000 mg/l (fig. 74). A computation of the energy value of Paluxy water was done for the town of Ben Franklin in Delta County; this locality is the only public water supply that draws from the Paluxy and that has the requisite data for this computation. During an average January, Ben Franklin, Texas, pumps 783,000 gal (2,963,890 l) of water at a temperature of 112° F (44° C) from a depth of 145 ft (44 m). The mean minimum

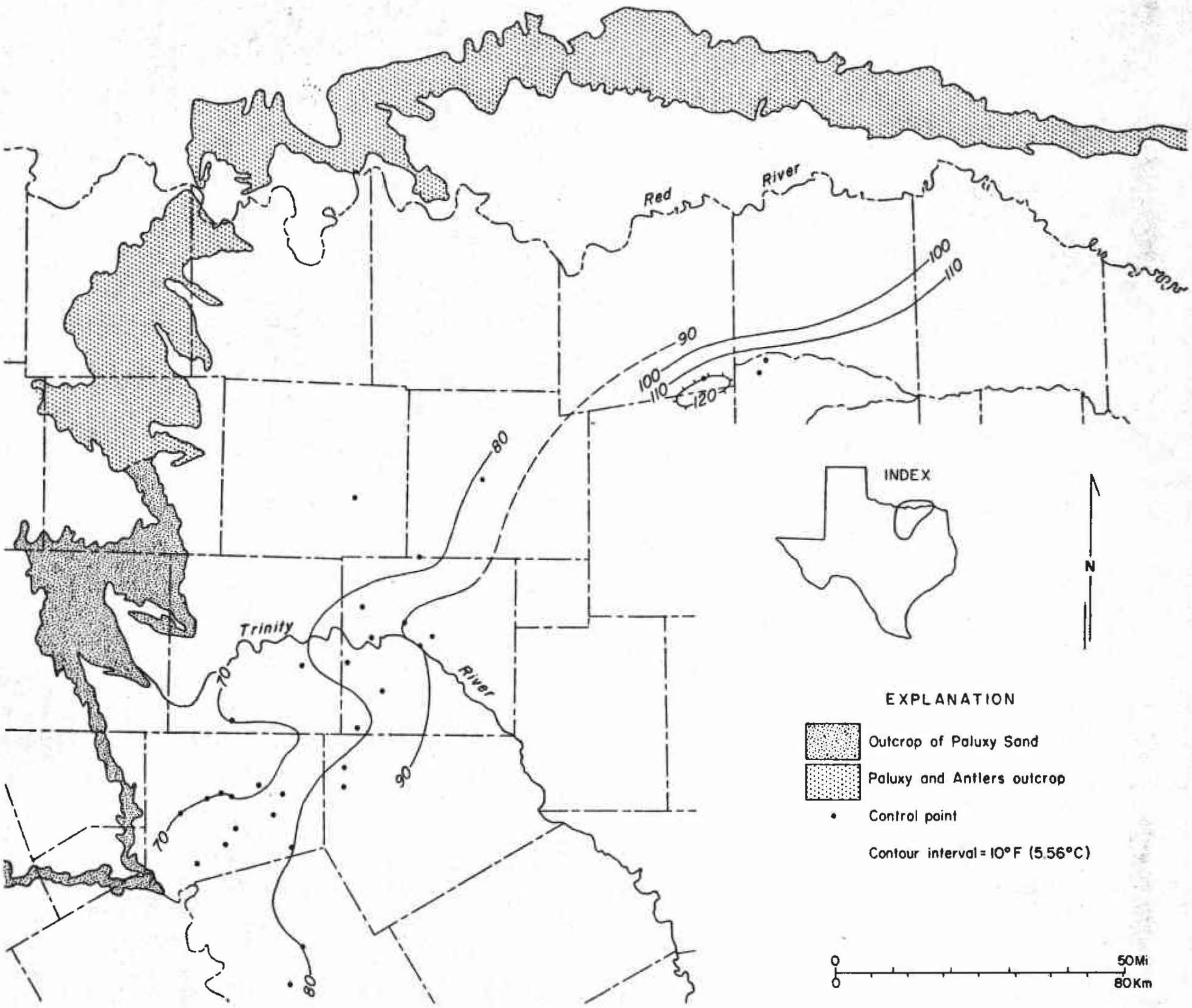


Figure 70. Water temperature contours for the Paluxy.

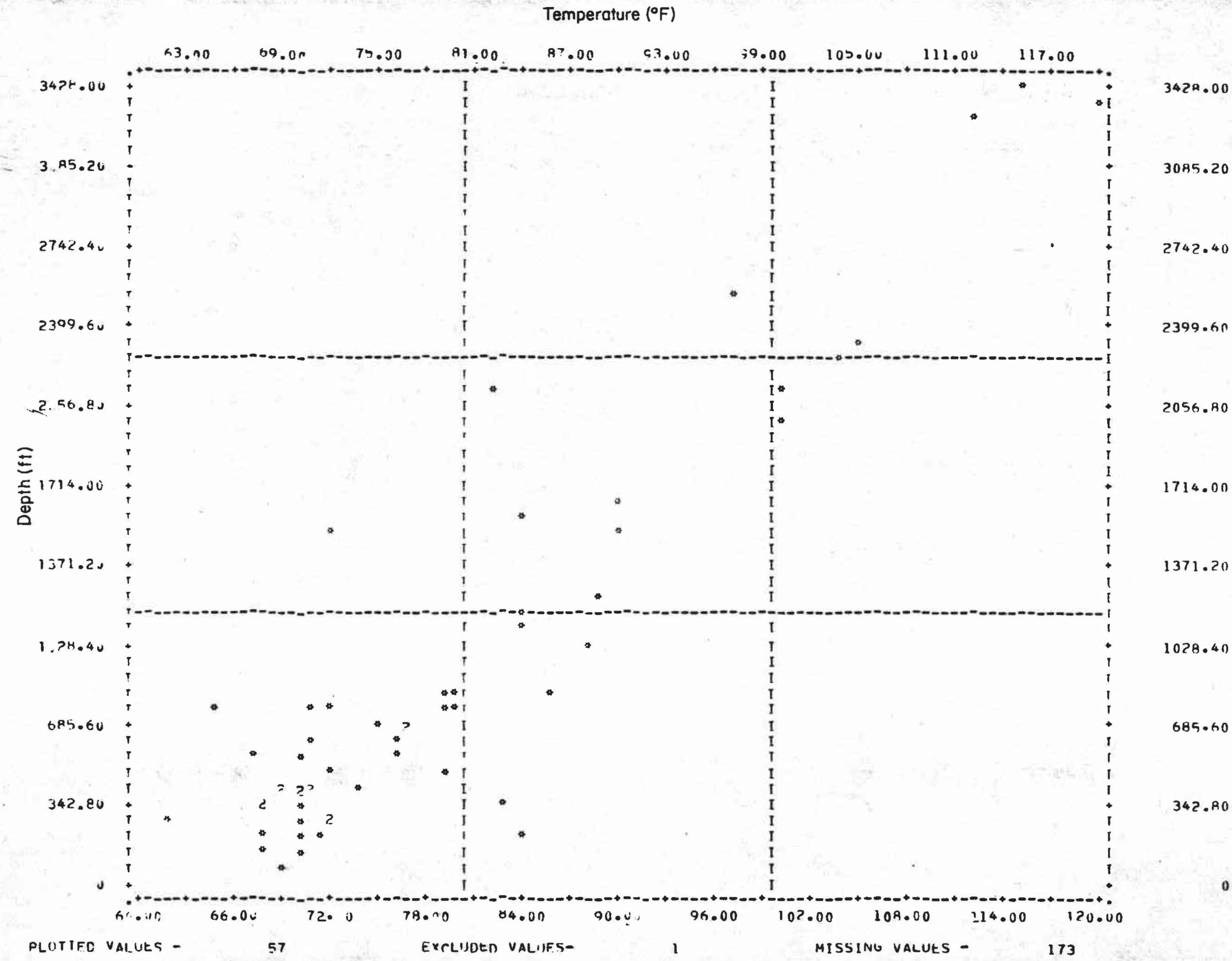


Figure 71. Temperature/depth scattergram for the Paluxy.

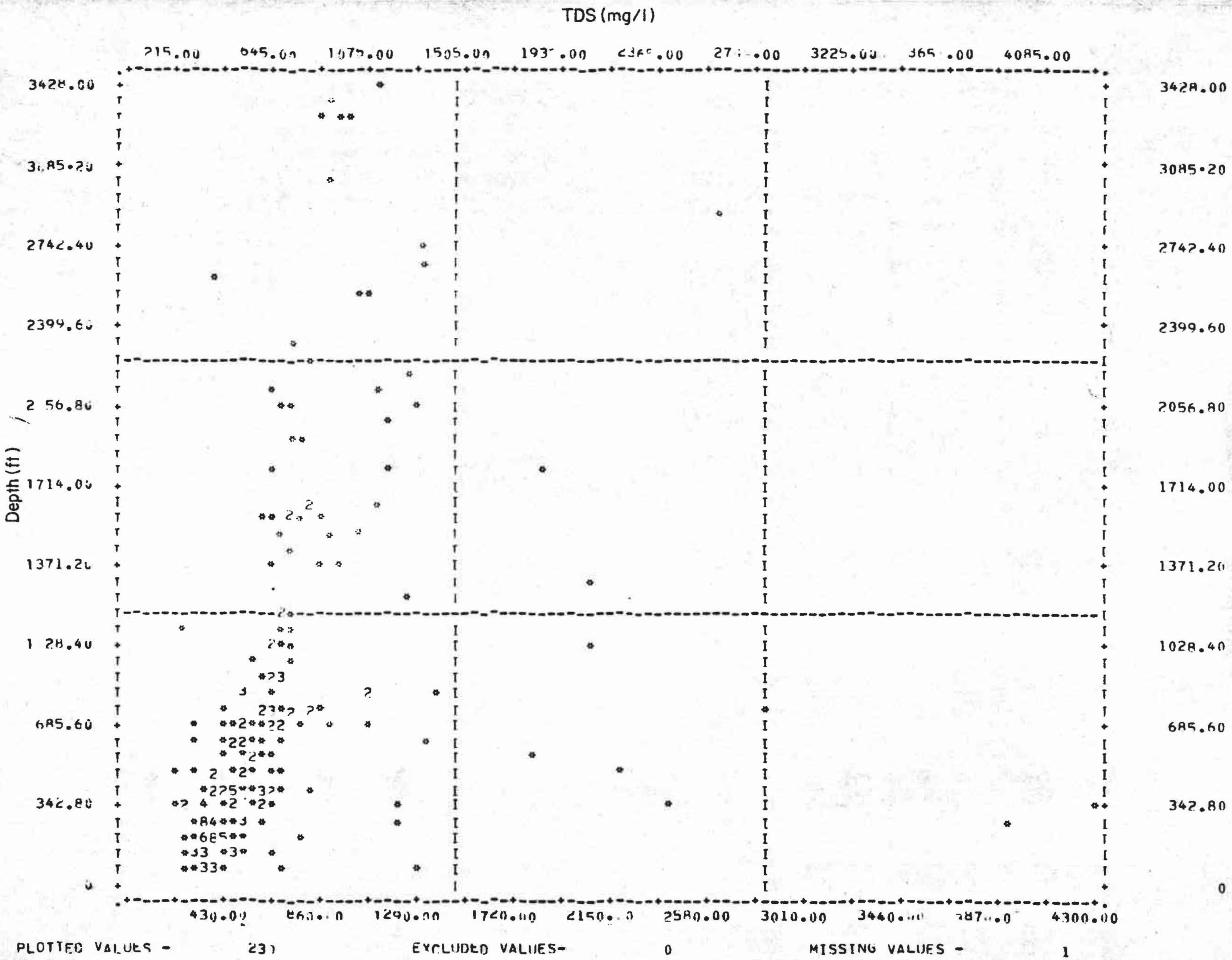


Figure 72. Total dissolved solids/depth scattergram for the Paluxy.

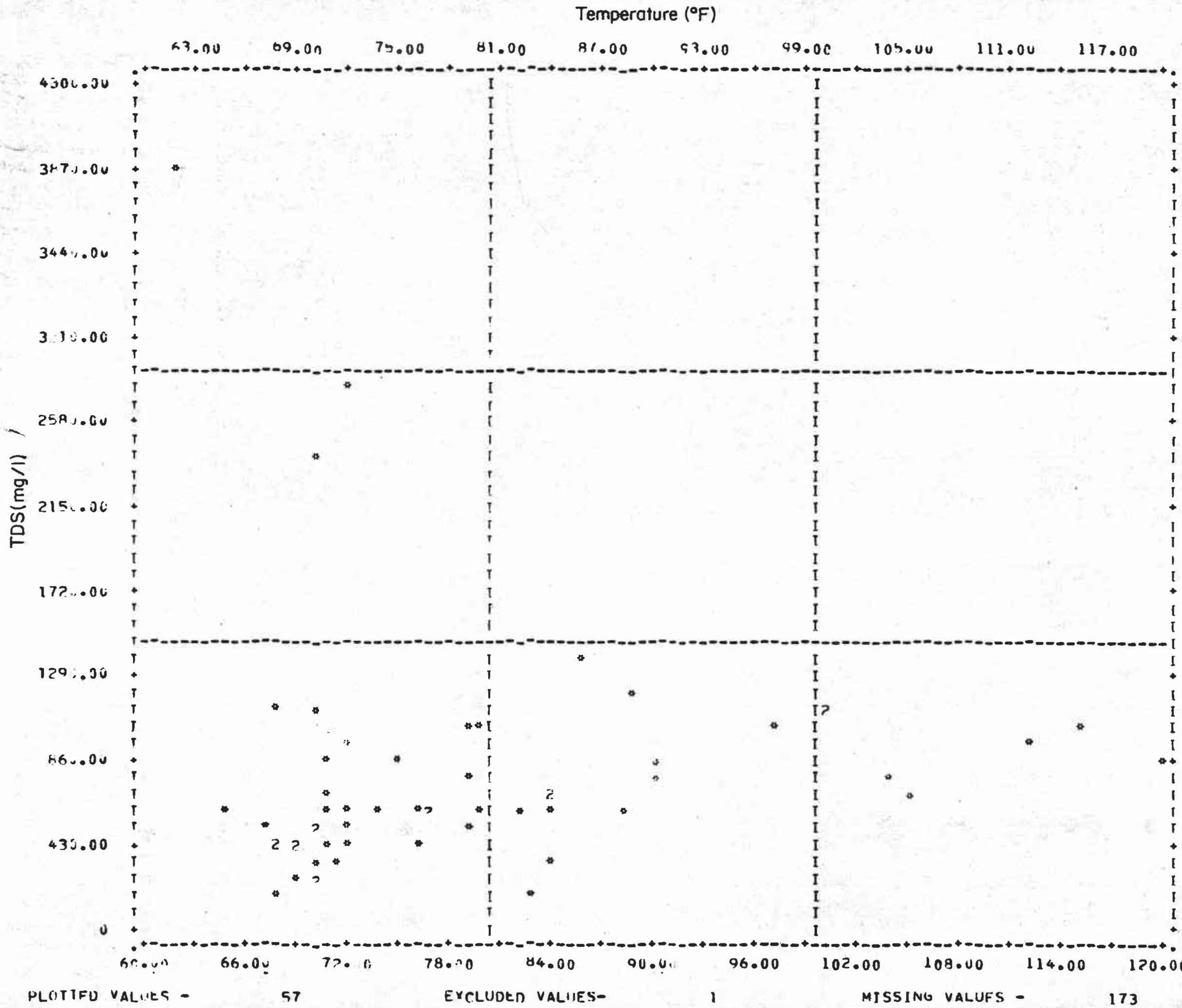


Figure 73. Temperature/total dissolved solids scattergram for the Paluxy.

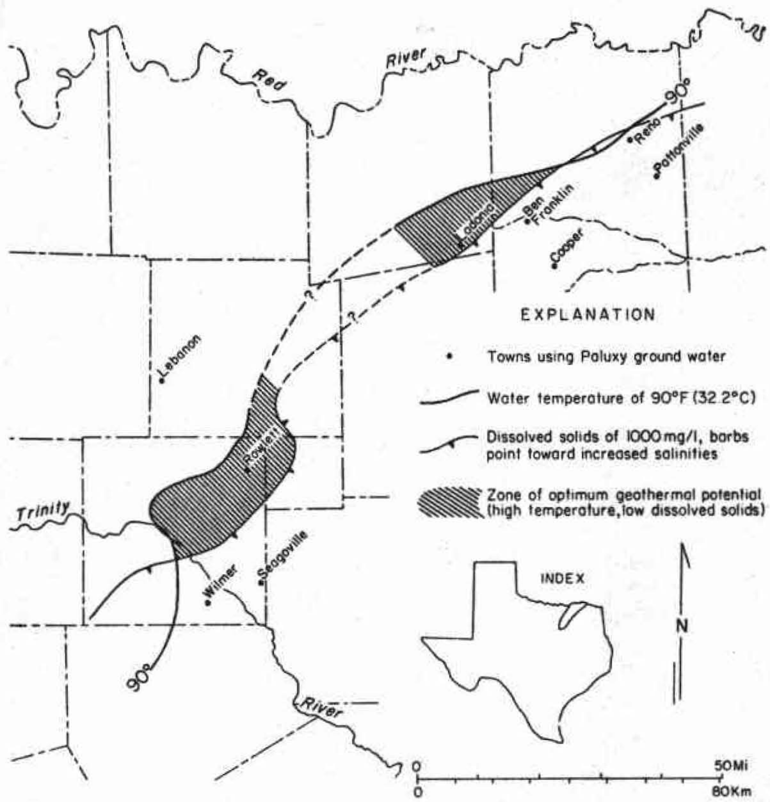


Figure 74. Municipalities using Paluxy ground water compared to areas of optimum geothermal potential.

Table 2. Selected municipal ground-water withdrawals--Paluxy aquifer (data from Texas Department of Water Resources).

County	Municipality	Mean January Pumpage (1972-1976)	Mean Yearly Pumpage (1972-1976)
Collin	Lebanon	1,964,015.5*	23,568,186
Dallas	Seagoville+	2,548,250*	48,507,671
Dallas	Rowlett	1,991,040	27,092,824
Dallas	Wilmer#	5,149,100*	62,371,615
Delta	Ben Franklin	783,500*	10,974,400
Delta	Cooper	1,201,322	13,935,822
Fannin	Ladonia+	1,496,000*	28,226,750*
Lamar	Pattonville	729,396	9,017,715
Lamar	Reno	1,018,500*	16,083,200

* indicates less than 5 years of measurements
\# draws from both Hosston/Trinity and Paluxy aquifers
⊕ draws from both Hosston/Trinity and Woodbine aquifers
\+ draws from both Paluxy and Woodbine aquifers

January temperature there is approximately 32.5° F (0.3° C). Hence, the energy debit owing to pumping is 1.22 x 10^6 Btu (3.07 x 10^5 kg-cal) during January; the energy assets during the same time period are 5.19 x 10^8 Btu (1.31. x 10^8 kg-cal). The total (maximum) energy credits for water pumped for municipal consumption is 5.18 x 10^8 Btu (1.31 x10^8 kg-cal). This modest energy balance does not reflect heat exchange efficiencies, but the main point is that the water is already produced, regardless of the heat. Any heat that can be extracted is essentially free, once the installation costs of using the heat are paid. As mentioned with respect to the Hosston/Trinity where a single-family dwelling consumes this hot-water, these costs are mainly for plumbing modifications to feed the water directly into the hot water distribution system of the home.

The probable area of greatest geothermal production within the Paluxy is within the deep sand trends of the fluvial-deltaic systems that compose the eastern part of the Paluxy aquifer. The hottest water temperatures presently produced from the Paluxy are yielded from wells that tap the marginal parts of this delta system. Other wells farther up the depositional trend (toward the Red River and Bowie County) might yield elevated temperatures but without the generally poor water quality observed farther west in Delta and Lamar Counties.

EDWARDS LIMESTONE

General

The Edwards Limestone is the only nonterrigenous unit investigated in this survey of low-temperature geothermal resources; it is an important aquifer in south-central Texas, supplying water along the Balcones Fault Zone from Kinney County north to Bell County. In its main aquifer reaches, however, water quality is consistently high and water temperature reflects average ambient air temperatures over the recharge areas. Farther downdip, notably in Atacosa, Caldwell, and Gonzales Counties, the Edwards is a reservoir rock for petroleum. Between the artesian aquifer zone and the local hydrocarbon accumulations downdip, there is a zone within the Edwards where variable amounts of water are produced having dissolved solids concentrations greater than 1,000 mg/l and commonly having elevated temperatures. This "bad-water zone" has historically yielded waters for local health resorts, such as at Terrell Wells in Bexar County. Hence, because it is known to yield warm water locally and because it provides an easily recognized structural datum in south-central Texas, we chose the Edwards as one of our targets for assessing lithic framework and water attributes.

The Edwards Limestone, however, does not persist as a significant unit throughout the study region. It becomes progressively thinner to the north, and as the Edwards thins, limestone strata equivalent to the underlying Comanche Peak become thicker; in North-Central and northeast Texas there is a nomenclatural change from Comanche Peak to Goodland Limestone (fig. 12). We did not continue our investigation far beyond the Lampasas and Little Rivers because that is where the Edwards thins markedly, and it is no longer an important aquifer beyond Bell County.

Structural Map of the Edwards Limestone

The structural map of the Edwards Limestone provides a detailed view of faults in south-central Texas (fig. 75). In general, the geometry of faults displacing the Edwards is similar to that seen on the Hosston structure map. However, there are areas, such as in Bexar County, where more detailed control for the Edwards has resulted in a more complex local pattern of faulting compared with that of the Hosston structure map. Also, there are areas, such as in Maverick County, where

Figure 75. Structural configuration of Edwards Limestone.

faults displacing the Edwards are mapped where no faulting of older strata is discerned.

Magnitude of fault displacement is generally somewhat greater for the Edwards compared with the Hosston. Down-to-the-coast faulting in the Balcones system is commonly as much as 300 ft (90 m) compared with a usual range of from 100 to 300 ft (30 to 90 m) for the Hosston. Maximum down-to-the-coast displacement mapped for the Edwards is 1,500 ft (457 m) in Bastrop County. Up-to-the-coast displacement of the Edwards occurs from Bastrop County into Caldwell County, and discontinuously from Guadalupe County into Bexar, Medina, and Zavala Counties. There is not a clearly defined up-to-the-coast Luling Fault System except perhaps within Caldwell and Bastrop Counties. Usual displacement there is somewhat greater than 100 ft (30 m), whereas maximum offset is approximately 600 ft (182 m) in Bastrop County.

The structural hinge is not as clearly evident on the Edwards structure map, probably because we lack extensive subsurface control updip from the hinge zone. There are nonetheless, increasing rates of dip in a basinward direction. Lowest dips measured are approximately 40 ft/mi (8 m/km) in Williamson County, and dips increase markedly into the Gulf Coast Basin where inclinations greater than 160 ft/mi (30 m/km) are common. The maximum dip measured for the Edwards Limestone is approximately 300 ft/mi (58 m/km) in northern Zavala County.

Several regional structural features are evident on the Edwards structure map. The Chittim Anticline and related faults appear in Maverick County. An east-trending anticline (possibly part of the Devil's River Uplift) occurs in southwestern Kinney County. The San Marcos Platform does not appear as a structural high at the scale presented here, but it is evidently the locus of the most intensive faulting in the region.

Thickness of the Edwards

The Edwards has been studied regionally by Rose (1972), who proposed the reclassification of the Edwards to group status with several component formations both in outcrop and in the subsurface. In this study, we are more concerned with thickness and structural attributes in the shallow subsurface, especially in the area within or immediately downdip of the Balcones Fault Zone. It is there that we presumed the geothermal potential of the Edwards to be greatest; the rock unit lies at a relatively shallow depth, yet its hydrologic and geochemical attributes still might allow production of low-temperature geothermal waters. Hence our isopach map (fig.

76) represents the aggregate thickness of the Edwards without regard to the various "formations" delineated by Rose.

This isopach map shows the thinning of the Edwards from west to east along strike, from thicknesses greater than 1,300 ft (400 m) in the Maverick Basin to less than 150 ft (46 m) in Bell County. Our mapping did not extend basinward far enough to show the pronounced thickening associated with the Stuart City Reef Trend (Bebout and Loucks, 1974), but the map does show a general basinward thickening trend, as expected. Local thick and thin areas might represent either small reef deposits, or they might be a result of attenuation owing to the well having penetrated a fault that displaced the Edwards (and thus shortened the section). A broad, thin area in Gonzales County probably is a result of the San Marcos Platform.

The major area of potential geothermal waters from the Edwards is within Medina, Bexar, and Guadalupe Counties. In that area, the Edwards in the subsurface is generally about 500 ft (150 m) thick. Farther west, in Uvalde County, thickness of the Edwards is more than 800 ft (240 m). However, we have generally concluded that structural attributes, and <u>not</u> stratigraphic setting, are most important in determining the various hydrologic attributes of the Edwards.

General Aquifer Properties of the Edwards

Within the study region, the Edwards aquifer consists of two parts--the fresh-water artesian system, and the "bad-water zone." Within the fresh-water part of the aquifer, water quality is uniformly high; concentration of dissolved solids generally ranges from 250 to 500 mg/l. Water temperature in the fresh-water zone is commonly less than 75° F (24° C). Within the bad-water zone TDS values range from 1,000 mg/l to 9,000 mg/l in a few wells. Water temperature within the bad-water zone is commonly greater than 100° F (38° C), although several data points in Guadalupe County indicate bad-water wells having temperatures comparable to those of the fresh-water part of the aquifer. Conversely, in southern Uvalde County, several wells have moderate TDS values (mostly less than 700 mg/l), water temperatures greater than 80° F (27° C), and a maximum value of 93° F (31° C).

The bad-water line that separates the two parts of the Edwards aquifer within the Balcones Fault Zone is delineated on the basis of the 1,000 mg/l isopleth. This line has been attributed to fault control and to facies changes, but it probably is a hydrologic barrier, representing the downdip limit of long-term phreatic transfer of meteoric waters from high structural and topographic levels in the western part of the region to the low-lying discharge points in the east (Abbott, 1975). The main lithic

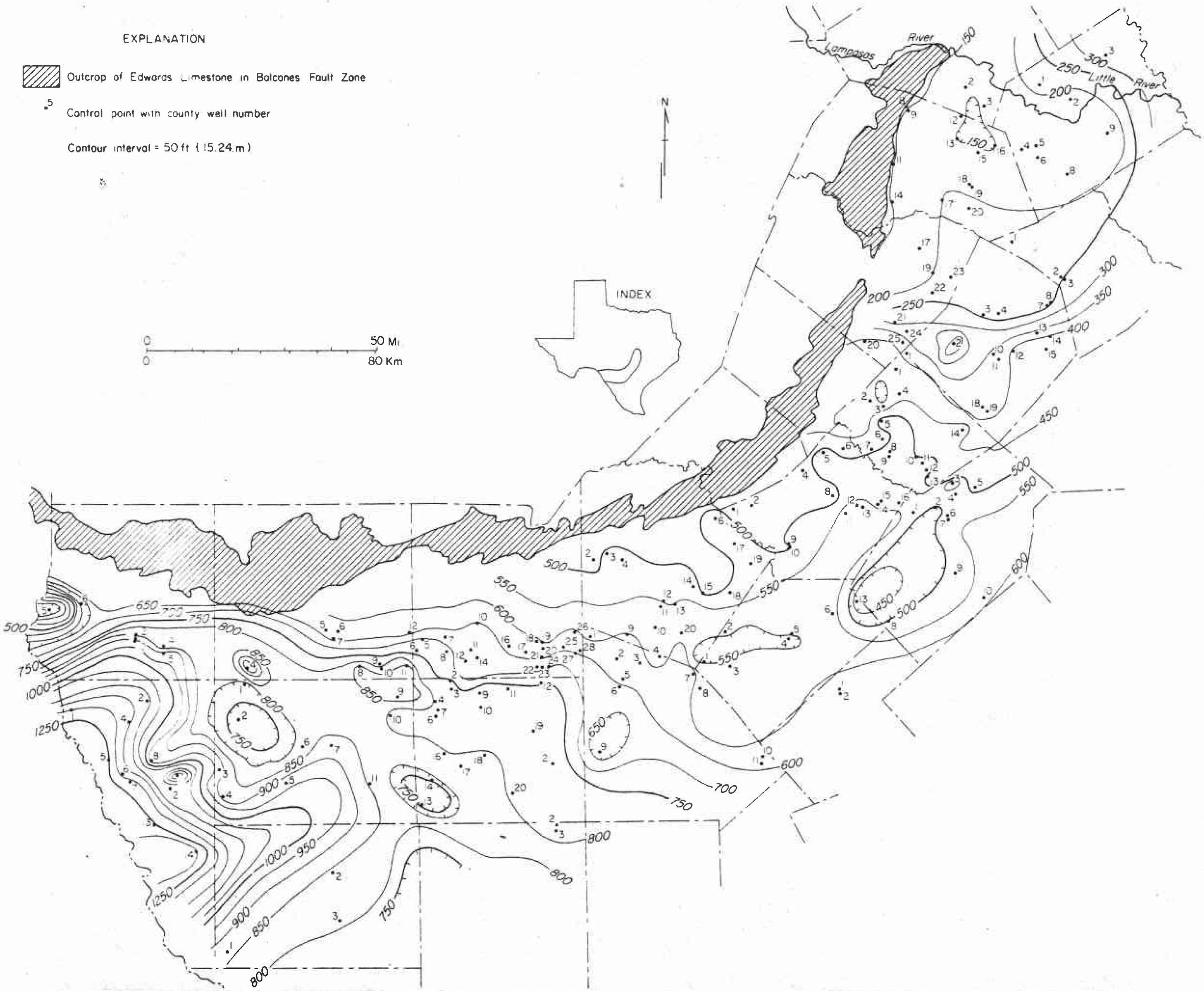


Figure 76. Isopach map of Edwards Limestone.

difference across the bad-water line is the absence of alteration owing to solutional activities of fresh water (Abbott, 1974). Water-level data are sparse across the bad-water line, but the closely spaced contours in eastern Travis and Williamson Counties suggest lower effective permeability values there (fig. 77).

Obviously, in a geothermal context, the "bad-water zone" of the Edwards Limestone is the major area of interest. However, just as obviously, water quality attributes across the bad-water line impose severe constraints on multiple use.

Southern Bexar County has a number of hot water wells producing from the Edwards (fig. 78), but TDS content is generally above 4,000 mg/l (fig. 79). Moreover, a geochemical study of the bad-water zone of the Edwards shows anomalous contents of base metals, particularly lead; too, there are wells tapping the Edwards in which fluorite is precipitating in the well bore (Dennis Prezbindowski, personal communication, 1978). These facts, in context of the regional structural setting, show that the chief significance of these Edwards waters is in relation to hydrothermal ore deposition. It appears that we are witnessing a Mississippi Valley-type ore deposit in a formative stage.

In short, the geothermal resource potential of the Edwards Limestone is not great, mainly because water chemistry prevents the use of the water as a potable supply. Even though Bexar County wells have water temperatures above 100^{o} F (38^{o}), waters from these localities are too saline to use for drinking. Only in southeastern Uvalde County does the Edwards yield water that might be used for drinking and heating needs. Yet, there the heat value is low.

In its artesian, fresh-water system, the Edwards suggests yet other possibilities. There the high yield, constant temperature, and low TDS values present a potential for using ground-water heat pumps to extract the caloric difference between summer and winter air-temperature extremes. That potential, however, involves different avenues of research than are employed here; nonetheless such an assessment warrants further study.

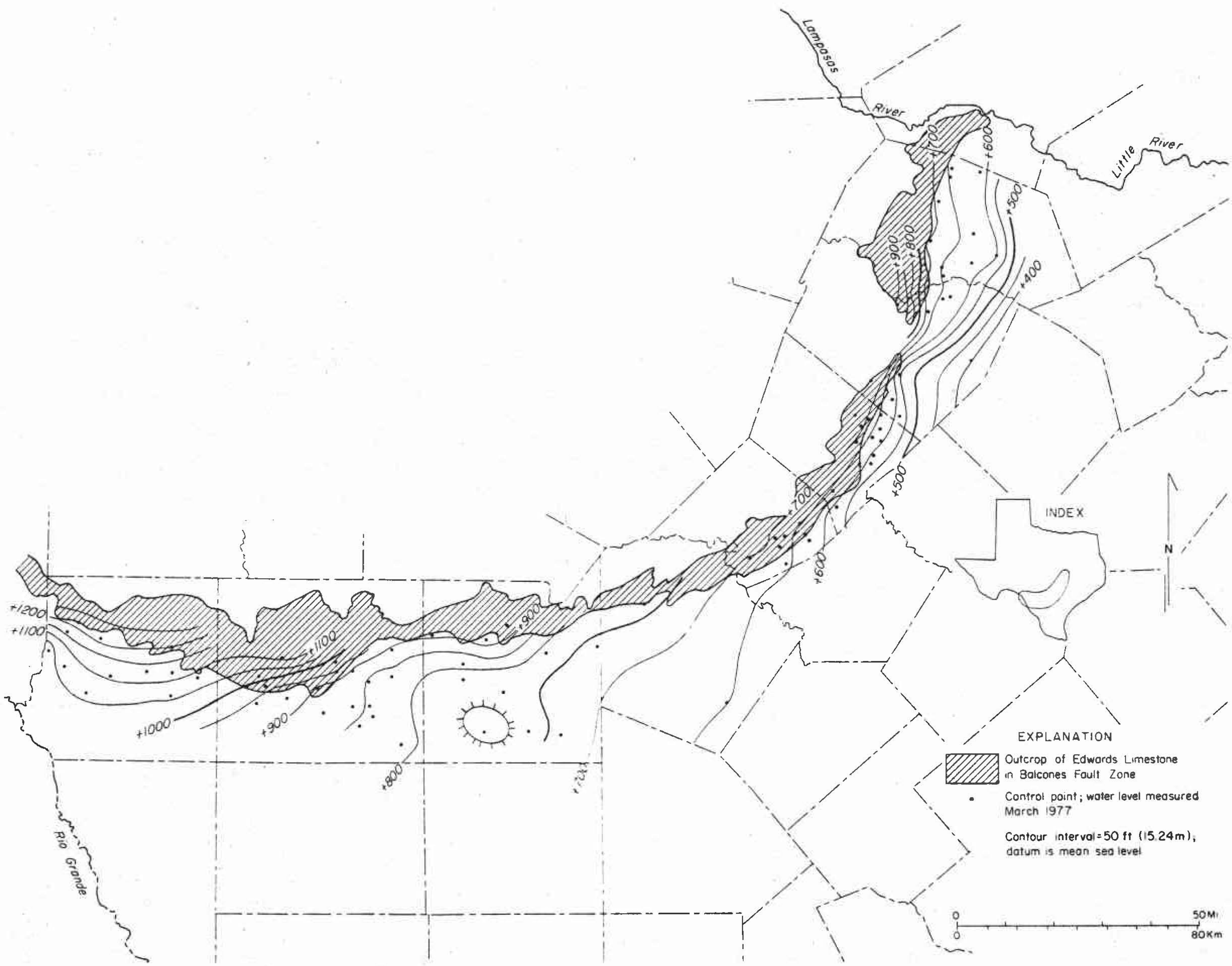


Figure 77. Water level contours for the Edwards.

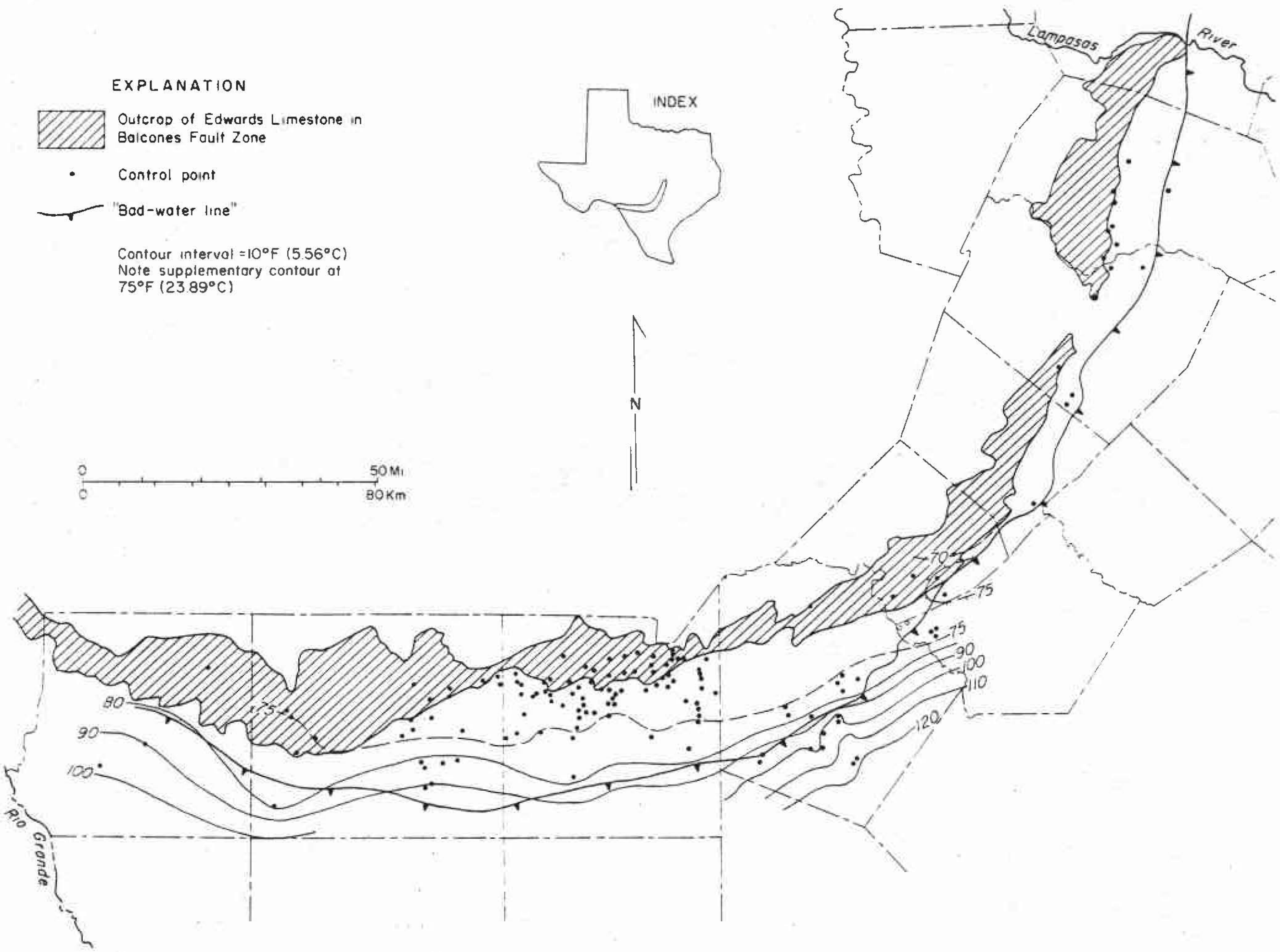


Figure 78. Water temperature contours for the Edwards.

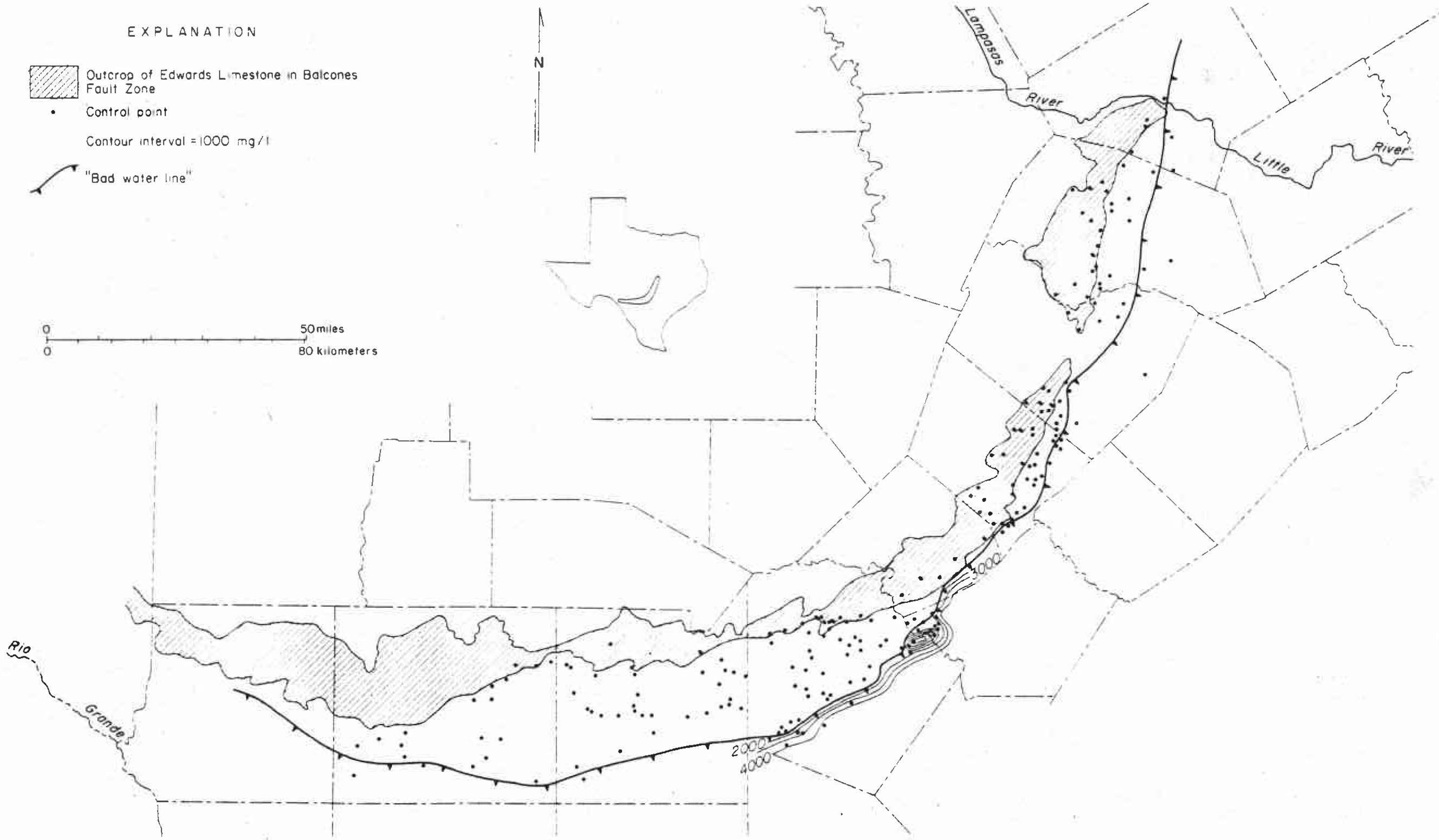


Figure 79. Total dissolved solids contours for the Edwards ("bad-water zone").

WOODBINE SAND

General

The Woodbine Sand is the youngest formation that we studied in our survey of low-temperature geothermal aquifers. It is of Upper Cretaceous (Cenomanian) age, whereas the other aquifers surveyed are all part of the Lower Cretaceous. Being stratigraphically higher, the potable water zone of the Woodbine aquifer extends farther into the East Texas Basin. In its downdip reaches, the Woodbine is an important petroleum reservoir, and in this context a survey of the geothermal attributes of the Woodbine has previously been conducted (Plummer and Sargent, 1931). However, this study focused on the downdip parts of the formation, where hydrocarbons occur, and not on the areas updip, where potable waters occur.

The Woodbine Sand was deposited into the northeastern part of the East Texas Basin by fluvial and deltaic systems that coursed off the Ouachita highlands. The Woodbine has been subdivided into two units--the lower Dexter Member and the upper Lewisville Member (Oliver, 1971). The Dexter Member consists of fluvial and deltaic sands deposited as the Woodbine systems prograded southward. The Lewisville Member consists of sands and muds deposited in shelf-strandplain systems during the marine-transgressive phase of Woodbine deposition. The Woodbine thins to the south, and marine (prodelta) muds represented by the Pepper Shale occur south of the zero net-sand line in the vicinity of McLennan and Falls Counties.

Net-Sand Distribution of the Woodbine

The net-sand map of the Woodbine shows both dip-oriented trends of the Dexter fluvial systems, and the strike-oriented sands composing parts of the high-destructive delta system and the coastal barrier-strandplain (Lewisville) systems (fig. 80). Our study did not extend far enough into the basin to depict fully the depositional geometry of the Woodbine, but comparison of sand geometry and the orientation of these sands with the Woodbine outcrop allows a more complete understanding of various hydrologic properties. Of great importance is the fact that the outcropping sands of the Woodbine Formation are generally distal or marginal to the major depositional trends (fig. 81). Unlike the Hosston/Trinity and the Paluxy, the Woodbine does not have major dip-oriented, high permeability sand bodies that provide conduits for recharge from the outcrop areas in North-Central Texas into the deep subsurface. Instead, the marginal (strike-oriented) sands have a relatively limited areal extent.

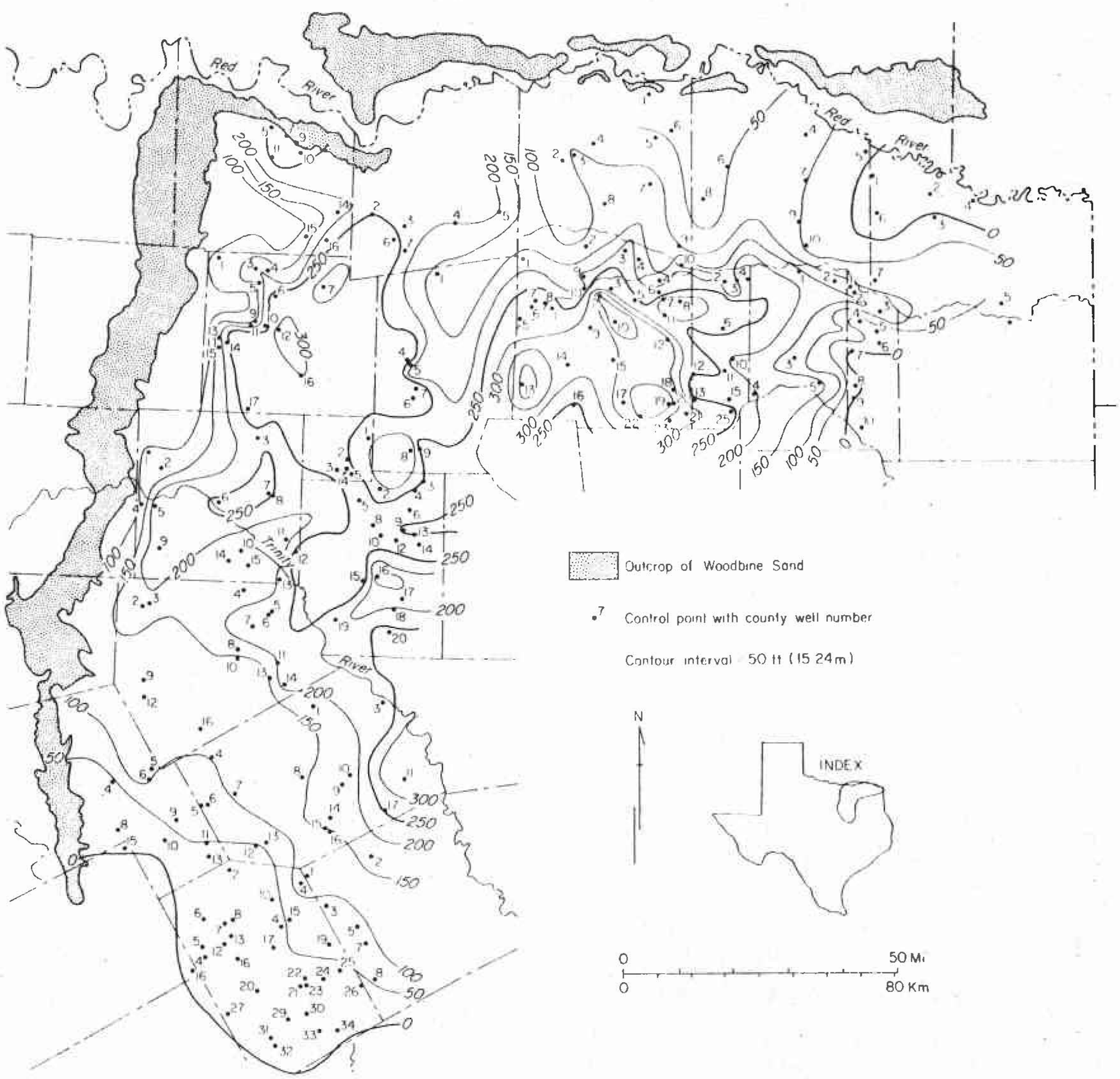


Figure 80. Net-sand thicknesses of the Woodbine.

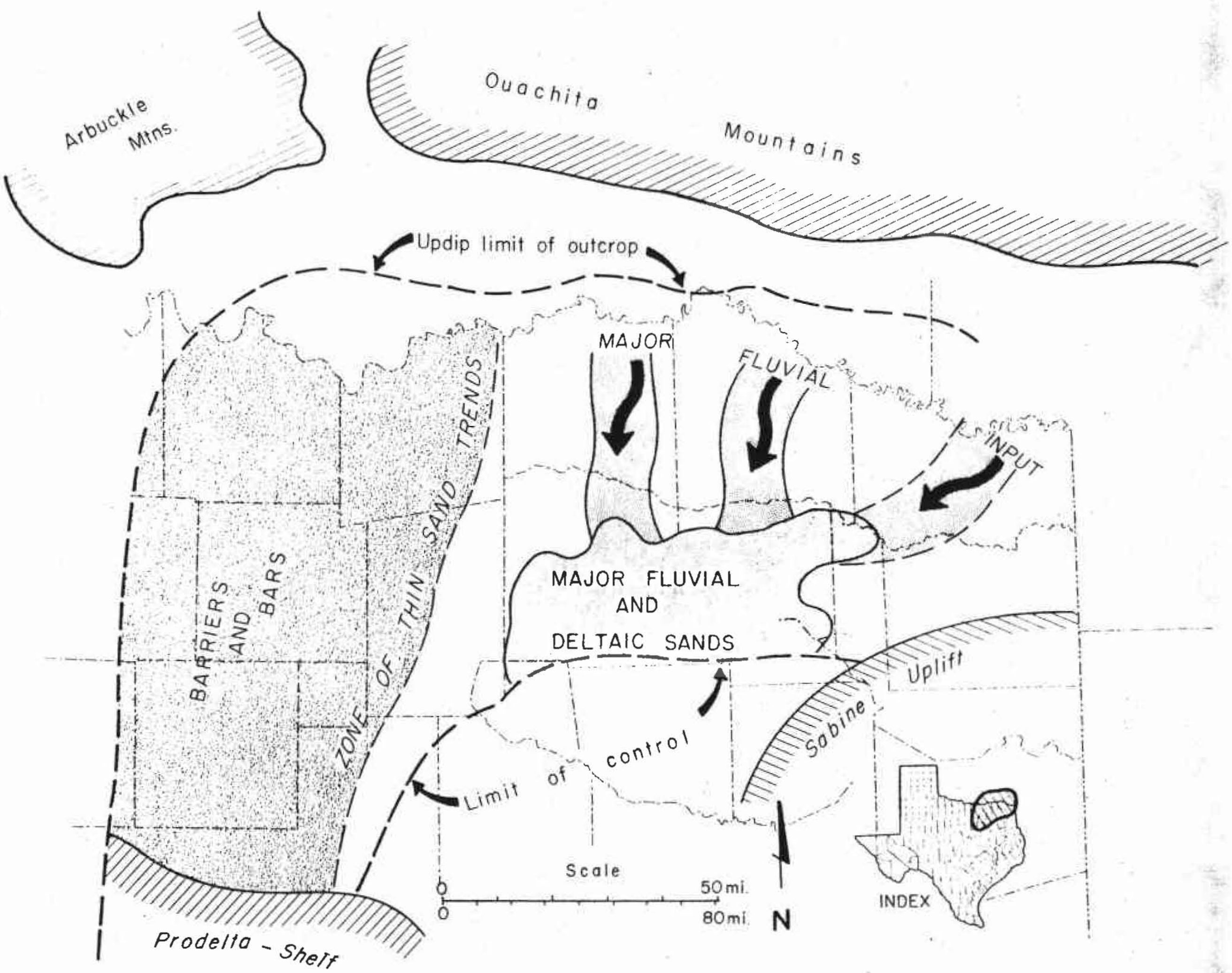


Figure 81. Schematic Woodbine paleogeographic map.

For this reason, aquifer properties there have (as expected) a high degree of lateral variability. Some dip-oriented sand trends provide conduits from the Woodbine outcrop in Oklahoma north of Lamar and Red River Counties, Texas; also there are major sediment feeder systems trending from the east, so that the major depositional trend appears to reflect the overall geometry of the subjacent fluvial deltaic systems of the Hosston/Trinity and the Paluxy. In all instances, the deltas debouched into an embayment with sediment derived mainly from the Ouachita Mountains to the north and from other sources to the east.

Structural Configuration of the Woodbine

The structural configuration of the Woodbine is similar to those of the Hosston/Trinity and the Paluxy. The structure contours drawn on the top of the Woodbine Sand parallel the Woodbine outcrop, with dips generally increasing from the Texas Craton into the East Texas Basin (fig. 82). The strike of the Woodbine trends roughly north-south throughout most of Texas, but the same flexure zone as noted for other strata occurs in Grayson County, where the Woodbine outcrop and structure contours bend abruptly and parallel the Red River in an east-west trend. The Sherman Syncline and the Preston Anticline are both visible on the Woodbine map. The same general fault system noted on other horizons in North-Central and northeast Texas displace the Woodbine as well. Our structural map extends only over the areas having measurable sand strata within the Woodbine. And, although this structure map extends beyond the area in which potable water is produced from the Woodbine, it does not extend into the most distal parts of the deltaic systems in the north-central part of the East Texas Basin.

Regional dip on the Woodbine Sand south of the flexure zone ranges from approximately 35 ft/mi (7 m/km) in Johnson and Ellis Counties to a maximum of more than 175 ft/mi (33 m/km) in Hunt County. East of the flexure, dips range from approximately 40 ft/mi (8 m/km) in Lamar County to about 200 ft/mi (38 m/km) in Delta County. Rates of dip are generally somewhat less south of the Talco Fault Zone, being locally as little as 40 ft/mi (8 m/km) in Morris County. This decrease in dip is due to the effect of the Sabine Uplift, an important structural element during Woodbine deposition.

Geometry of faults that displace the Woodbine is almost identical to those affecting the Paluxy. Displacement of the Woodbine, however, is commonly somewhat less than the offset mapped for the Paluxy. The displacement mapped across the graben composing the Talco Fault Zone shows the Woodbine to have maximum up-to-

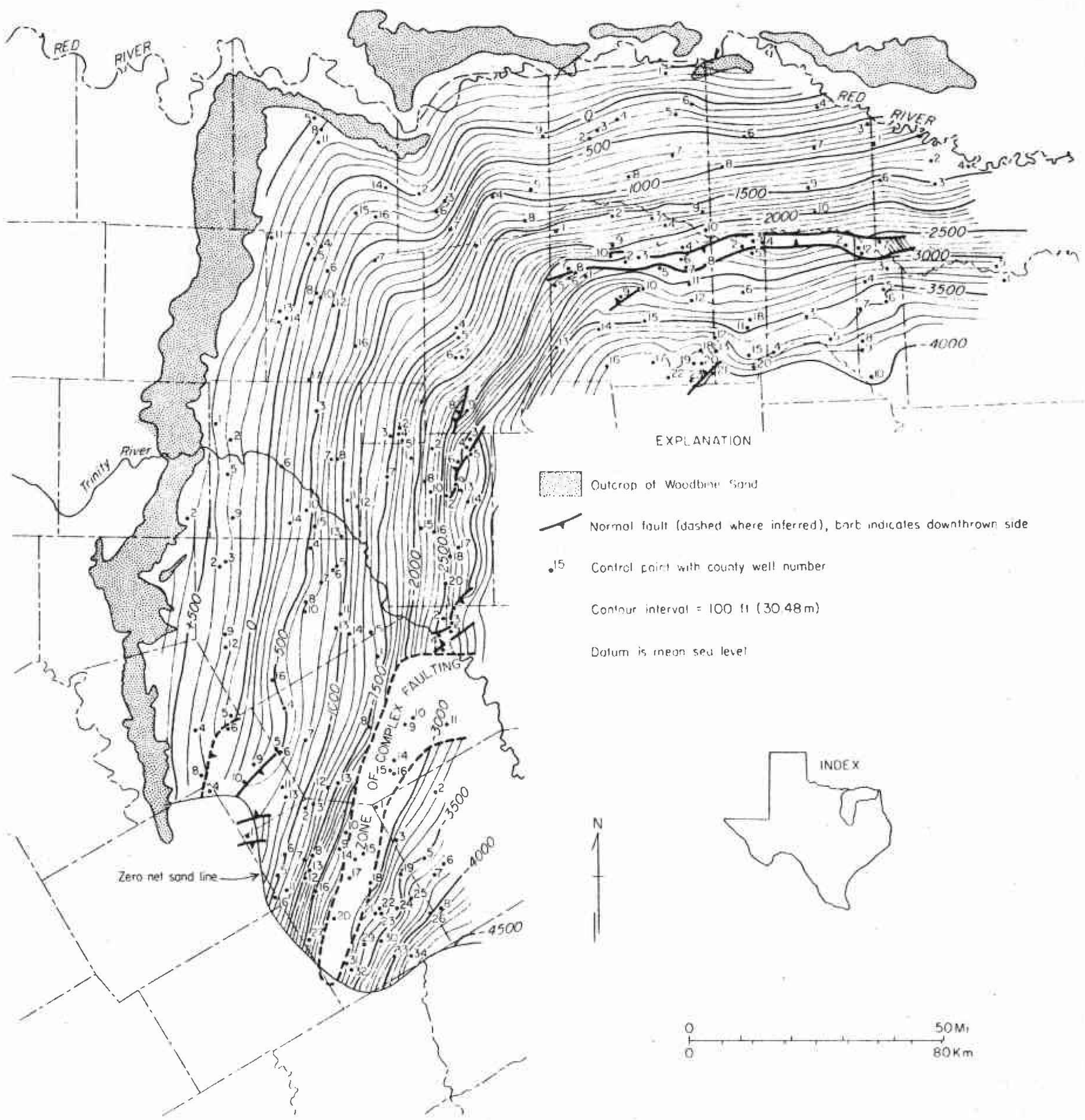


Figure 82. Structural configuration of the Woodbine.

the-coast displacement of 500 ft (150 m) in Titus and Morris Counties. Maximum down-to-the-coast displacement is approximately 700 ft (213 m) in Red River County. Usual net stratigraphic offset across this fault zone is 400 to 500 (120 to 150 m) in a down-to-the-coast direction compared to 600 to 800 ft (180 to 240 m) for the Paluxy. In the northern part of the Mexia Fault Zone, up-to-the-coast displacement of as much as 300 ft (90 m) is seen in Kaufman County. As with the other structural maps, fault displacement is not shown in the part of the Mexia Fault Zone lying within the central part of the study region; instead it is denoted as a "zone of complex faulting." Down-to-the-coast displacement of approximately 200 ft (60 m) occurs in Hill County in the northernmost extension of the Balcones Fault System.

General Aquifer Properties of the Woodbine

The Woodbine Sand yields potable water--and thus is an aquifer--from Hill and Navarro Counties, north to Cooke and Grayson Counties, and from there, east to Lamar County. As expected, most ground-water production occurs in the updip parts of the aquifer in areas closest to the outcrop (recharge zone). But as already mentioned in the context of net-sand distribution, the Woodbine outcrop represents environments marginal to the major depositional systems. That is, most of the Woodbine Sand in the updip areas near the outcrop is made up of marginal parts of strike-fed facies (probably strandplain and offshore bar deposits). Hence, unlike the Hosston/Trinity and the Paluxy Sands along the western margin of the East Texas Basin, there are no evident dip-oriented fluvial systems that trend normal to the outcrop strike. The major dip-oriented Woodbine Sands occur in Lamar County and farther east in Red River and Bowie Counties. Our data do not indicate that these fluvial and deltaic sands produce ground water; the easternmost ground-water production occurs near the zone of thin sands that trends northeast-southwest in Fannin, Lamar, and Hunt Counties and that delineates the boundary between fluvial-deltaic systems and the strandplain-barrier systems farther west.

Water Level of the Woodbine

The water level contours of the Woodbine Sand lie generally parallel to the structural contours of the formation (fig. 83), and the flexure zone where the structural trends change from a north-south to an east-west orientation is clearly evident on the water level map. South of the flexure, the water level surface generally dips basinward at about 12 ft/mi (2.3 m/km) compared with a minimum regional dip of approximately 35 ft/mi (7 m/km) there. East of the flexure the water

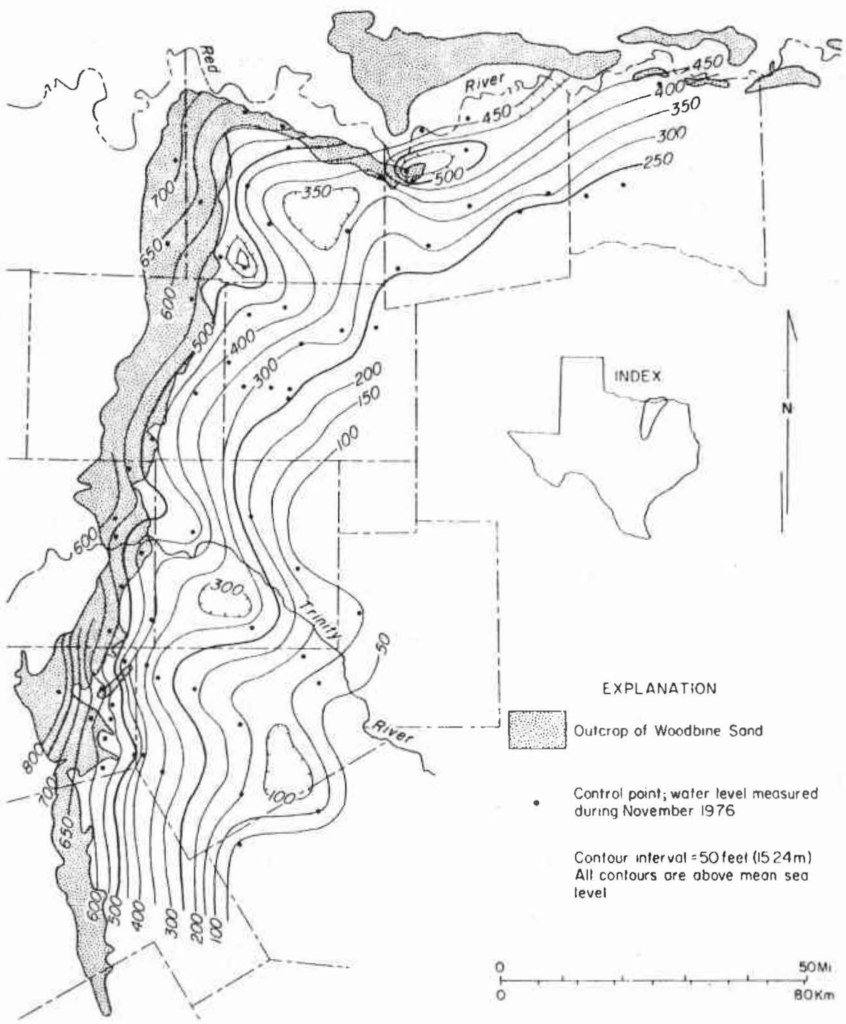


Figure 83. Water level contours for the Woodbine.

level is inclined southward at about 14 ft/mi (2.7 m/km) compared with structural dip there of approximately 80 ft/mi (15 m/km) in Lamar County. The Woodbine aquifer is clearly under artesian conditions throughout most of its extent, but there are numerous wells in the outcrop area and in the shallow subsurface that are apparently under water table conditions.

There is no consistent, region-wide relation between water level contours and sand trends, except in Ellis County where the sands thin abruptly in a southward direction. In that area there is a marked convergence of water level contours, indicating lower rate of ground-water flow; dip of the water level surface is almost 27 ft/mi (5 m/km) in Ellis County.

Unlike the relation between surface drainage network and water levels of the deeper aquifers studied (the Hosston/Trinity and the Paluxy), surface water drainage patterns clearly affect the ground-water level contours of the Woodbine. An elongate trend having a relatively high potentiometric surface occurs beneath the Trinity River in Dallas and Tarrant Counties. A similar high occurs beneath the East Fork Trinity River in Grayson and Collin Counties, and a local closure of water level contours occurs in Fannin County immediately south of the Red River. These relations suggest that, even though the aquifer is under artesian conditions, there is some recharge through confining beds from the major perennial streams overlying this aquifer.

Local areas of relatively low water-level surfaces are probably the result of well pumpage. Examples occur in southeastern Ellis County, in southern Dallas County, and in central Grayson County. In all instances, these "cones of depression" occur in an area of probable municipal or industrial withdrawal from the Woodbine.

Water Quality of the Woodbine

Water quality attributes of the Woodbine aquifer are indicated on the map that shows contoured isopleths of TDS values of selected water wells (fig. 84). This map shows two major trends with respect to water quality: (1) TDS values increase with increasing aquifer depth, and (2) TDS values decrease with increasing sand thickness. The relation between water quality and sand thickness is easily seen in eastern Dallas County and northeastern Collin County, where relatively low TDS content correlates geographically with thick sand bodies in those areas (see fig. 80). Conversely, a striking correlation between poor water quality and thin sand trends is evident in southern Grayson County and northern Collin County. The precipitous water-quality decline in southeastern Fannin County parallels contours denoting the zone of thin sands that separates the major Woodbine depositional systems. There is also an abrupt

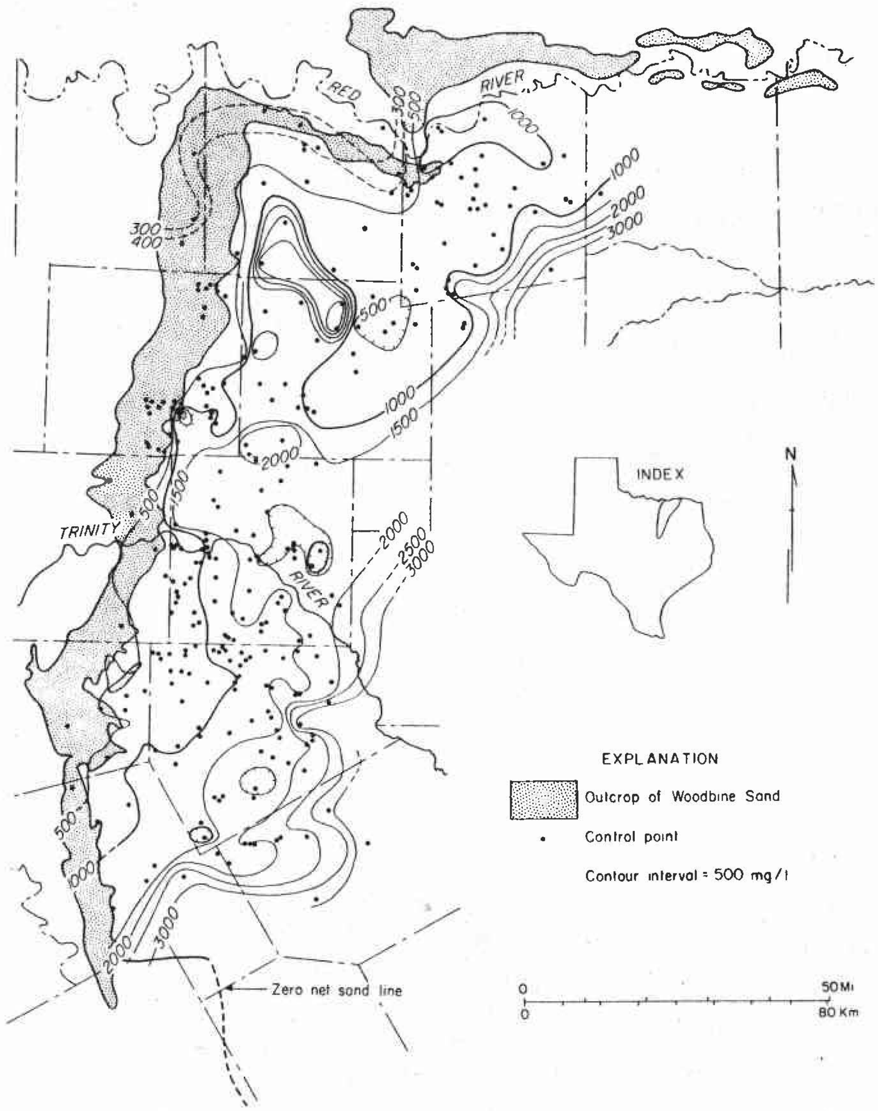


Figure 84. Total dissolved solids contours for Woodbine ground water.

total dissolved solids increase in Hill and Navarro Counties, near the southern limit of measurable sands in the Woodbine.

The relation between TDS and depth is graphically presented as a scattergram of all Woodbine water quality values available from the Texas Department of Water Resources computer files (fig. 85). This plot shows a considerable range in TDS values with respect to depth, and the general trend shows a somewhat higher rate of increase in TDS with depth compared with similar plots for the other aquifers investigated. The plot that compares water temperature with TDS (fig. 86) also shows a considerable amount of scatter, but, as with the Hosston/Trinity and Paluxy scattergrams, the TDS values are not extremely sensitive to changes in temperature. Still, for a given temperature increment, the increase (or amount of scatter) for TDS data is somewhat greater than for other aquifers.

Water Temperature of the Woodbine

Water temperature data for the Woodbine aquifer are sparse; moreover, the density of these data points is unevenly distributed. Thus, there are areas (indicated as dashed isopleths on figure 87) where water temperature values are inferred.

Temperatures of Woodbine ground water ranges from less than 70^{o}F (21^{o} C) near the outcrop, to a maximum of approximately 100^{o} F (38^{o} C) in Fannin County. As with water quality, there is a general trend of increasing water temperature with increasing aquifer depth.

Selective water temperature values for the Woodbine are plotted with respect to depth (fig. 88) and, as expected, the plot shows a positive correlation between temperature and depth. However, the plot of Woodbine temperature values shows considerably more scatter among data points than is seen for the other aquifers investigated. This scatter of values may result from the diverse facies that compose the Woodbine near its outcrop belt. It might also be due to mixing of waters from various stratigraphic horizons, or it might be a result of contamination from surface waters containing a high content of dissolved solids.

Geothermal Potential of the Woodbine

There are several towns in North-Central Texas that use ground water from the Woodbine aquifer for public water supply (table 3). However, most of these towns use water that contains dissolved solids in concentrations greater than 1,000 mg/l (fig. 89). The zone of optimum geothermal potential for Woodbine ground water, that is, where

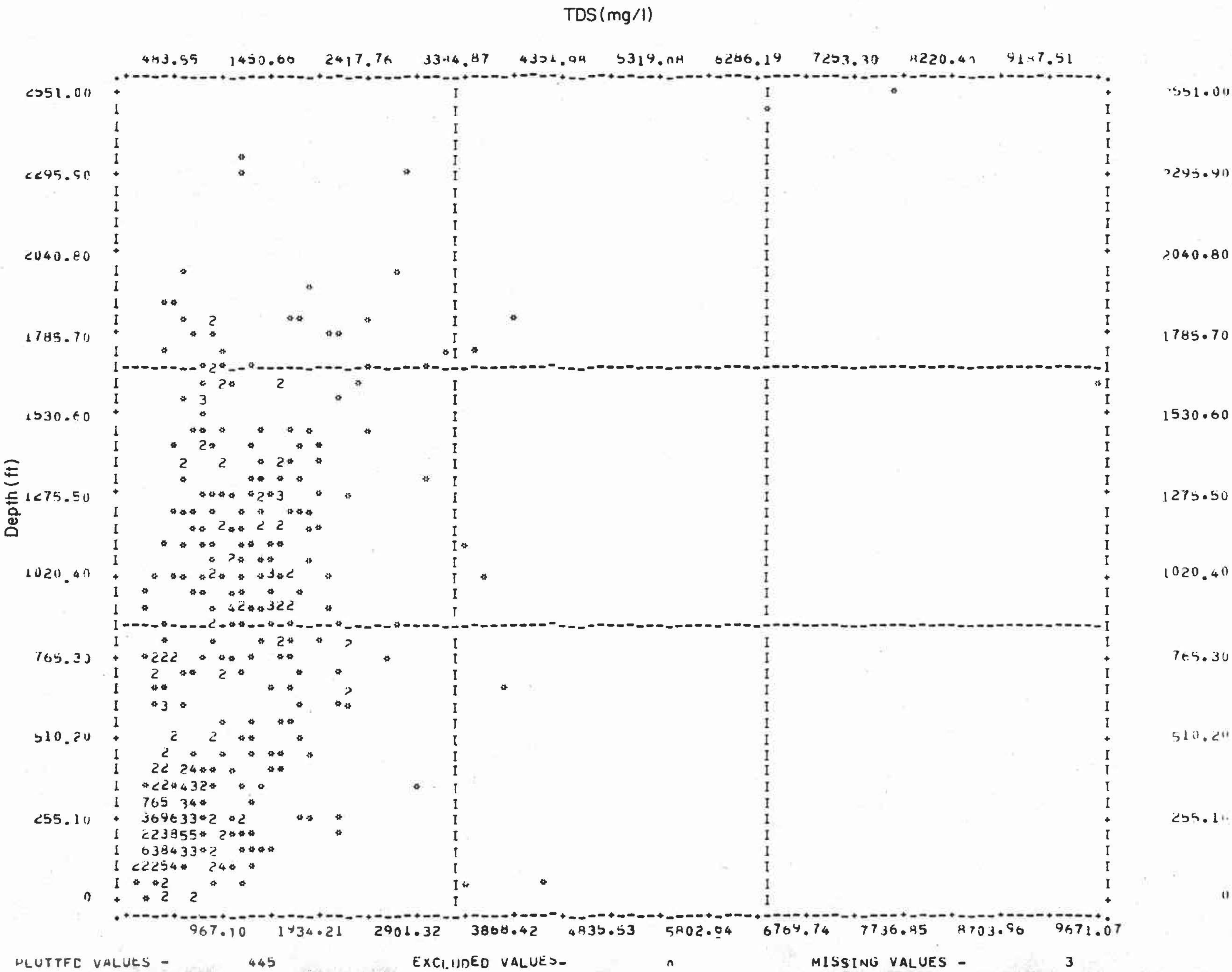


Figure 85. Total dissolved solids/depth scattergram for the Woodbine.

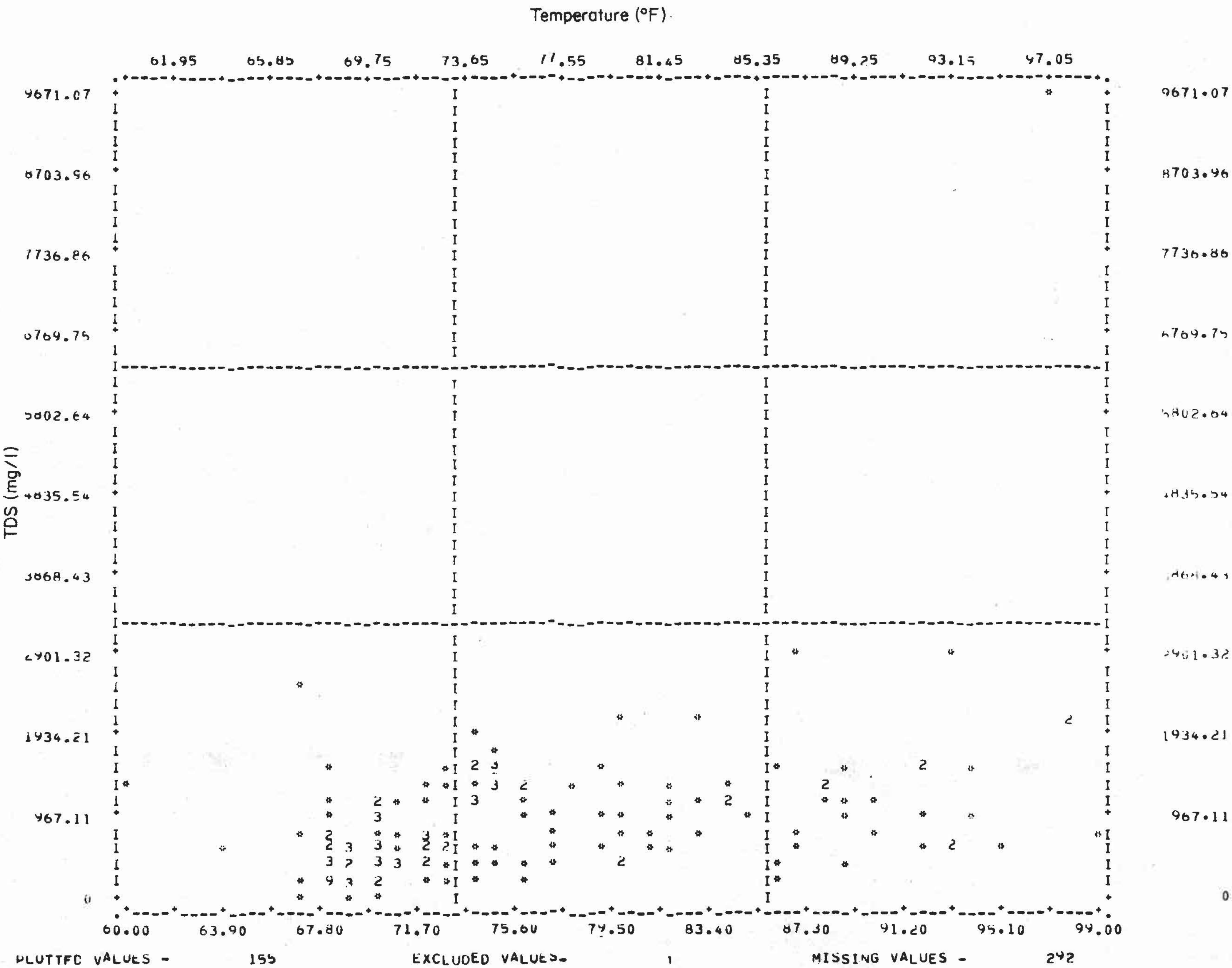


Figure 86. Temperature/total dissolved solids scattergram for the Woodbine.

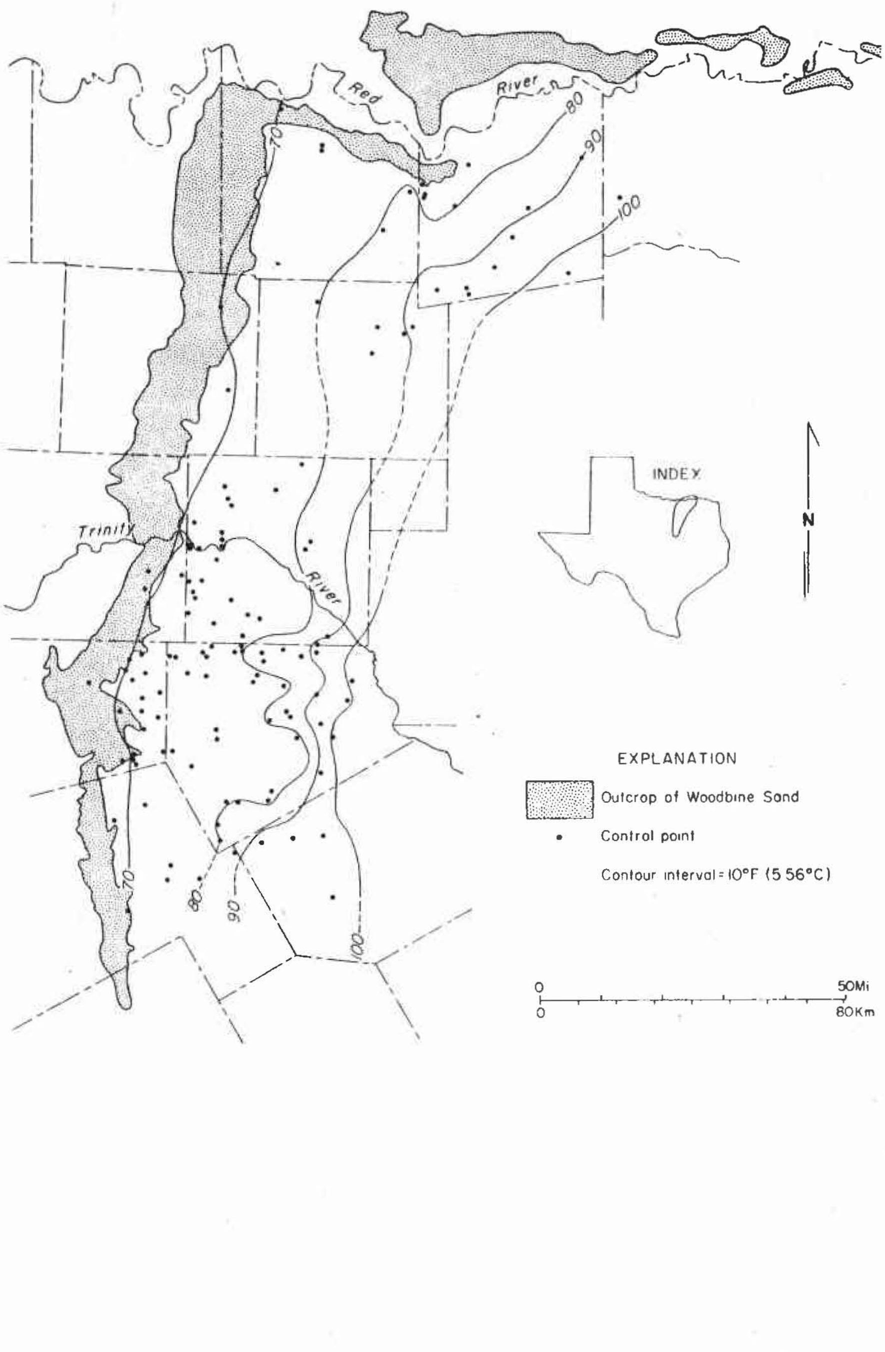


Figure 87. Water temperature contours for the Woodbine.

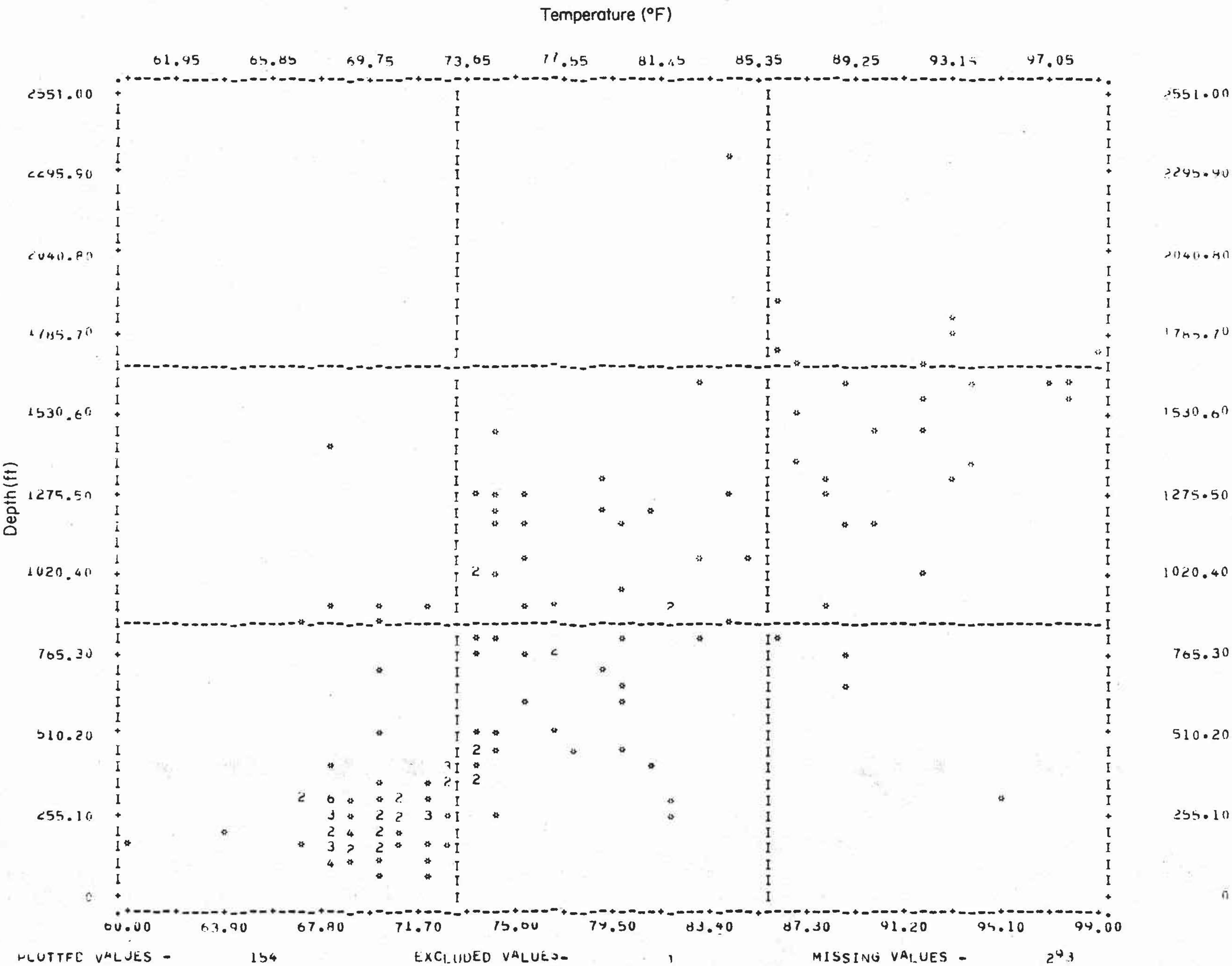


Figure 88. Temperature/depth scattergram for the Woodbine.

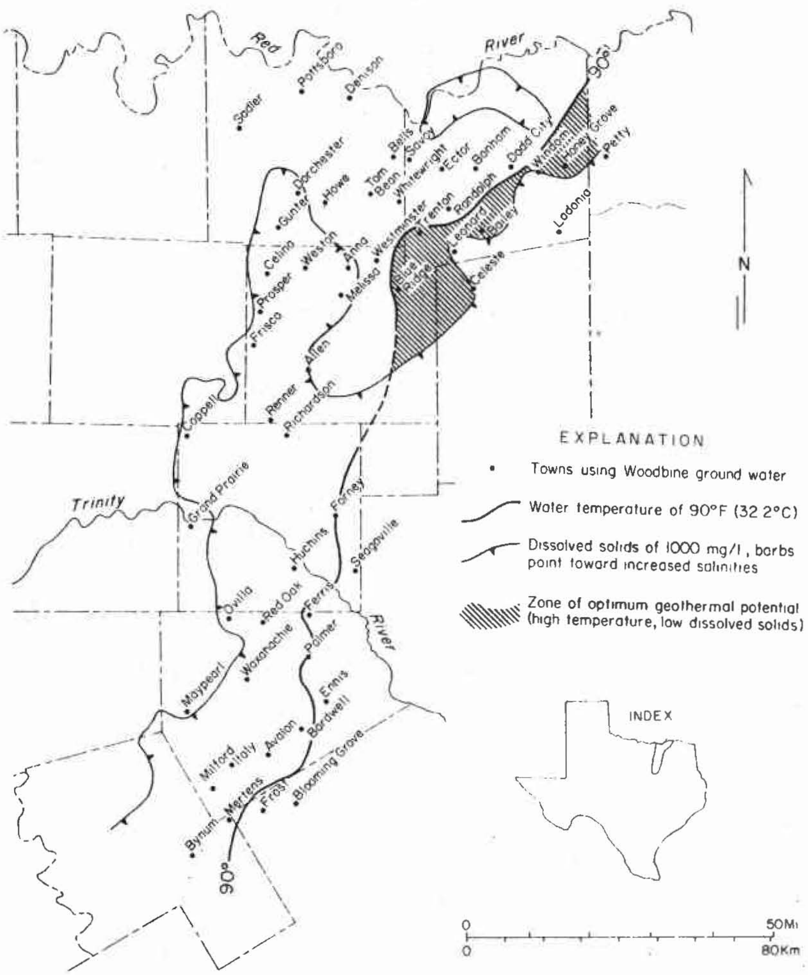


Figure 89. Municipalities using Woodbine ground water compared to areas of optimum geothermal potential.

Table 3. Selected municipal ground-water withdrawals--Woodbine aquifer (data from Texas Department of Water Resources).

County	Municipality	Mean January Pumpage (1972-1976)	Mean Yearly Pumpage (1972-1976)
Collin	Allen	5,806,400	73,170,200
Collin	Anna	1,684,333*	20,212,000
Collin	Blue Ridge	720,596	10,275,220
Collin	Celina⊕	3,445,420	44,923,840
Collin	Frisco⊕	7,540,000	102,232,000
Collin	Melissa	663,300*	13,346,340
Collin	Prosper	680,540	11,202,509
Collin	Renner	929,000*	11,148,000
Collin	Westminster	858,678	20,720,465
Collin	Weston	194,056	3,491,315
Dallas	Coppell⊕	3,847,733*	35,005,267*
Dallas	Seagoville+	2,548,250*	48,507,671
Dallas	Grand Prairie⊕	140,509,440	1,870,745,220
Dallas	Hutchins	7,114,020	79,342,180
Dallas	Mesquite	2,293,890	28,918,060
Dallas	Richardson	403,820	7,837,260
Ellis	Avalon	287,571*	3,450,850*
Ellis	Bardwell	457,846	6,060,783
Ellis	Waxahachie	998,063	14,388,541
Ellis	Ennis	700,000*	10,900,000*
Ellis	Ferris	5,388,800	70,093,000
Ellis	Italy	2,337,300	32,642,500
Ellis	Maypearl	595,000	7,301,000
Ellis	Milford	1,426,000	21,246,860
Ellis	Ovilla	600,450	8,457,860
Ellis	Palmer	3,843,040	50,342,220
Ellis	Red Oak	1,853,148	26,017,240
Fannin	Bailey	189,625*	5,590,460
Fannin	Bonham	20,622,000*	312,722,000*
Fannin	Dodd City	334,300	4,053,000
Fannin	Ector	668,500*	9,147,750*
Fannin	Honey Grove	6,734,000	85,706,800
Fannin	Ladonia+	1,496,000*	28,226,750*
Fannin	Leonard	4,419,320	54,397,940
Fannin	Randolph	205,464	2,736,301
Fannin	Savoy	2,009,400	25,848,000
Fannin	Trenton	2,238,980	24,555,692
Fannin	Windom	331,400*	4,090,812

* indicates less than 5 years of measurements
⊕ draws from both Hosston/Trinity and Woodbine aquifers
\+ draws from both Paluxy and Woodbine aquifers

Table 3 (cont'd)

County	Municipality	Mean January Pumpage (1972-1976)	Mean Yearly Pumpage (1972-1976)
Grayson	Bells	2,118,820	26,167,640
Grayson	Denison	2,763,379	34,458,032
Grayson	Gunter	2,060,600	26,200,000
Grayson	Howe	5,661,860	72,847,144
Grayson	Pottsboro	1,104,648*	14,549,033
Grayson	Sadler	445,450*	6,750,475*
Grayson	Tom Bean	1,695,228	22,173,377
Grayson	Van Alstyne	3,457,918	40,734,162
Grayson	Whitewright	5,974,100	77,170,872
Hill	Bynum	197,067*	2,364,800
Hill	Itasca⊕	6,124,600	90,406,484
Hill	Mertens	180,000*	4,239,300
Hunt	Celeste	174,420	22,021,520
Lamar	Petty	385,020	5,071,120
Navarro	Blooming Grove	2,029,302*	21,173,130
Navarro	Frost	1,500,000*	18,000,000

* indicates less than 5 years of measurements
⊕ draws from both Hosston/Trinity and Woodbine aquifers
\+ draws from both Paluxy and Woodbine aquifers

TDS values are less than 1,000 mg/l and water temperature is greater than 90° F (32° C), occurs only within a narrow zone in Collin, Fannin, and Hunt Counties.

Within the "optimum zone" the town of Blue Ridge during January pumps an average of 720,596 gal (2,727,672 l) of water at 93° F (34° C) from 385 ft (117.4m). The energy expended in obtaining this water during an "average" January equals 2.97 x 10^6 Btu (7.5 x 10^5 kg-cal), and the heat value of the water consumed equals 4.16 x 10^7 Btu (1.05 x 10^7 kg-cal). The net energy gain of 3.8 x 10^7 Btu (9.6 x 10^6 kg-cal) is worth only \$95, assuming a (conservative) dollar value per Btu of \$2.5 x 10^{-6}. As mentioned in the context of the other geothermal aquifers, this caloric asset is a maximum value; it does not account for heat-exchange efficiencies or other factors that result in a loss of energy. Nonetheless, this warm water is presently consumed regardless of its energy values, and people should be aware of its potential.

Despite elevated TDS concentrations, ground water produced from the other towns that lie outside the optimum geothermal zone still has a potential for supplying warm water for space heating and other purposes. For example, a current project is underway to obtain 126° F (52° C) water from a depth of approximately 2,200 ft (670 m) at Corsicana in Navarro County. The dissolved solids content of this water is roughly 5,000 mg/l, but the water is to be used solely for its heat content and not for drinking purposes. When a heat exchange system is employed, the water need not meet drinking-quality standards. But in these instances the heat value alone must justify drilling the well and pumping the water. The many towns that presently use high-TDS Woodbine ground water for drinking and for other purposes as well; this results in an added credit in terms of amortizing drilling and pumping costs.

The area not presently tapped for water supply but which is of greatest future potential for producing geothermal ground waters from the Woodbine is in Hopkins County along the thick sand trends that make up the fluvial and deltaic systems there. These sands are deep enough (greater than 3,000 ft, or 915 m) to have elevated water temperatures comparable to those of the deep parts of the Hosston aquifer in Central Texas. But despite the depth, the orientation of sand trends indicates that there might be direct hydrologic communication with the Woodbine outcrop (recharge area) approximately 50 mi (80 km) to the north. Similar thick sand bodies occur in Franklin, Titus, and Morris Counties; these areas also warrant study for their geothermal resource potential.

CONCLUSIONS

The area delineated by the Balcones and Luling-Mexia-Talco Fault Zones is a low-grade geothermal province. It is denoted by a convergence of structural and stratigraphic features that define a major tectonic hinge zone. The normal faults expressed at the surface form a graben across part of the region, and these surface structures are superjacent to the buried Ouachita structural belt. The Ouachita belt contains zones of thrust faulting and progressively higher grades of metamorphism as dip increases precipitously into the Gulf Coast Basin. The Jurassic subcrop begins near the downdip extent of recognizable Paleozoic rocks, and this indicates that the hinge zone delineates one locus of initial rifting of the Gulf of Mexico.

The Balcones/Ouachita structural trend is an area of anomalously high geothermal gradient, and there several aquifers contain waters with elevated temperatures. The source of this heat is conjectural, but it may be a result of (1) deep circulation of meteoric waters along faults, (2) upwelling of connate waters from the deep subsurface, either from deformed Ouachita rocks or from Jurassic strata, (3) stagnation of deep ground waters owing to faults that retard circulation, (4) local hot spots, such as high radiogenic heat sources (felsic plutons) within the basement complex, or (5) other loci of high heat flow.

Of the various aquifer systems that we initially recognized as yielding ground water in Central Texas, the Hosston/Trinity Sands show the most promise as a geothermal resource. These sands occur across the largest area and exhibit some of the best developed fluvial and deltaic trends of any aquifer investigated during this project. The Hosston/Trinity strata are extensively faulted in the Balcones and Luling-Mexia-Talco Fault Zones, and most displacement occurs in a down-to-the-coast direction. The Hosston/Trinity occurs directly above much of the Ouachita structural belt, and farther downdip these sands are in contact with (and are locally indistinguishable from) underlying Jurassic strata. Hence, because of downfaulting and because the Hosston/Trinity compose the basal Cretaceous sands, these aquifers occur at greater depths than others studied. All of these attributes--areal extent, sand geometry, faulting, stratigraphic position--have contributed to the geothermal potential of the Hosston/Trinity. Geographic extent and orientation of sand trends combine to mediate such aquifer properties as sustainable well yield and water quality, whereas depth and structural configuration enhance the elevated temperature of ground water. In short, a combination of factors, some fortuitous, some interrelated, has resulted in deep aquifer systems that yield a large amount of potable water at temperatures that are locally high with respect to aquifer depth. Moreover, these warm-water-bearing strata occur beneath one of the major population trends in Texas, and the many institutions and other energy consumers along the Balcones-Blackland belt constitute a large potential market for the low-temperature geothermal waters.

Of the other Cretaceous aquifers investigated, only the Paluxy and Woodbine Sands show promise for multiple use. That is, these warm-water-bearing sands, also yield enough water to supply domestic, municipal, and industrial needs and have water quality suitable for drinking. In both instances, however, the heat content is less in comparison with the Hosston/Trinity, and commonly, the dissolved solids content of the Paluxy and Woodbine is higher than that of the deeper basal Cretaceous sands. Excluding use of the water for human consumption, deep reaches of these aquifers show further promise as geothermal resources. Thick deltaic sands occur deep beneath the Talco Fault Zone in northeast Texas. These sands should possess hydrologic properties conducive to high well yields, yet they are deep enough to have some of the highest water temperatures of any within the study region. However, dissolved solids content will probably also be high, and the exact composition of solutes within these waters must be tested to ascertain the engineering problems associated with the operation of heat-exchange systems.

The other two aquifers, the Hensel Sand and the Edwards Limestone, do not appear promising as geothermal resources. The Hensel is unacceptably limited in its downdip extent because of facies changes; sand deposits end and lime or mud deposits begin in the very areas where the aquifer is deep enough to consistently possess elevated water temperatures. The Edwards Limestone is sufficiently hot in its "bad-water zone" to serve as a low-temperature geothermal resource, but water quality attributes there pose severe problems. Much of this deep Edwards water is a hydrothermal brine, and locally, fluorite is precipitating and clogging well bores. These geochemical attributes are intriguing in context of economic geology, but they pose problems for design of a heat exchange system. For multiple use for providing energy and drinking water the Edwards might have potential in its phreatic zone, where large volumes of water at less than 75° F (24° C) supply a population of more than one million people. This resource, however, demands an altogether different kind of technology (a ground-water heat pump that extracts heat from the air during summer and from the water during winter), hence the hydrogeologic and climatic assessments are entirely different from those presented here. That avenue, however, does have potential that warrants further study.

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Appendix to

REGIONAL ASSESSMENT OF GEOTHERMAL POTENTIAL ALONG THE BALCONES AND LULING-MEXIA-TALCO FAULT ZONES, CENTRAL TEXAS

Final Report

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May 1979

Bureau of Economic Geology
The University of Texas at Austin

W. L. Fisher, Director

APPENDIX

The appendix contains a computer-based index of subsurface control (mainly electric logs) that we used in interpreting the structural and stratigraphic framework of the region. This index is presented by county in alphabetical order, and for each county there are two pages of information. The first page presents data obtained mostly from the electric log headings (operator, fee, owner, depth, ground elevation, etc.), but it also contains identifying well numbers and a few lithic interpretations. Most of the geologic interpretations, however, are presented on the second page, where we show our findings regarding each of the aquifers considered during this project. For the Hosston/Trinity, the Hensel/Rodessa, the Paluxy, the Edwards/Goodland, and the Woodbine, we show elevation of top of formation and, as appropriate, thickness and net sand values. Wells in some counties have few interpretations because of geographic extent of the various aquifers, well casings through the horizons of interest, or poor-quality logs. Nonetheless, all wells were encoded because temperature data and depth were used to compute geothermal gradients, even if no lithic data could be obtained. Some of the encoded values represent our estimations, and for these, an "E" is printed following the number. For logs that show only part of a section, a "greater than" symbol (>) preceeds the partial value. All values are positive unless denoted by a minus sign.

Wells that compose our data base are identified by two numbering systems, a county index and a state-wide index. The county numbering system consists of a one- or two-digit integer that is unique to a specific well within a given county. This number is employed to (1) locate and identify the control points used to construct all geologic maps and cross sections in this report and (2) relate the map-based control points to data in the appendix. Figure 4 depicts the location of all wells having these county numbers; these numbers appear at the left margin of both pages of data and interpretations in this appendix. The state-wide numbering system is the locational index used by the Texas Department of Water Resources. It consists of a nine-digit alpha-numeric code that presents a county identifier (using two-letter prefix) and a series of seven (numerical) digits subdivided by hyphens into three numeric "sets." This series locates the well in context of eighty-nine 1-degree grids, each of which is subdivided into sixty-four 7.5-minute grids, which are, in turn, subdivided into nine 2.5 minute grids (fig. A-1). Whenever we used a control point having an unknown state index number, we followed this identical procedure, except that an additional hyphen was inserted between the 2.5-minute grid number and the "arbitrary" well number, thus subdividing the numerical part of the code into four sets instead of three. Whereas, any well having a number verified as being a correct state well number is denoted by the last three digits (2.5-minute number and "arbitrary" number) without a hyphen separating them.

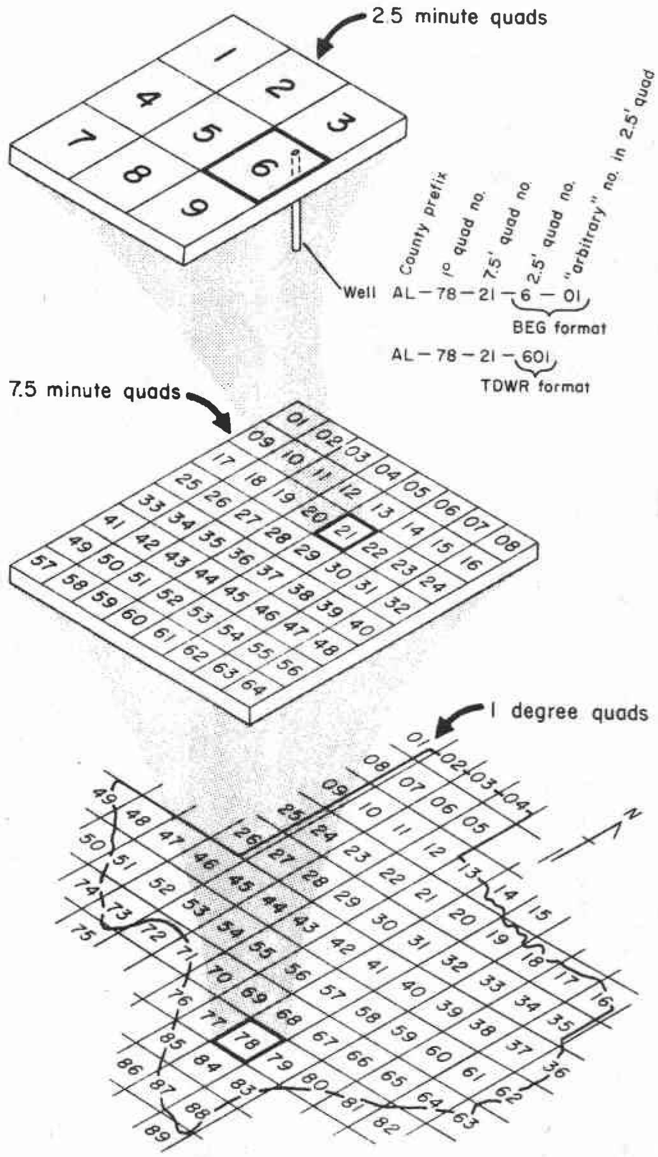

Figure A-1. State well numbering convention (modified from Texas Department of Water Resources sources).

ATASCOSA COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	68-50-3-1	TENNECO	01	SMITH		01-29-68	664	4769	125	NO	YES			NO
02	68-51-8-1	TENNECO	01	J J SMITH		02-10-69	649E	5558	145	NO	YES			NO
03	68-52-7-1	TENNECO	01	ROGERS		03-13-68	590	5963	150	NO	YES			NO
04	68-52-9-1	BAILEY,ESTES,COLE	01	SCHULTZE		04-06-55	650E	4005	120	NO	NO			NO
05	68-59-6-1	TENNECO PENNZOIL	01	FINCH		04-03-69	552	6562	145	NO	YES			NO
06	68-59-5-1	TENNECO	01	CLIMER		12-15-67	535E	6930	166	YES	YES			NO
07	68-61-3-1	TENNECO PENNZOIL	01	SUGGS		03-17-69	522	7315E	161	NO	YES			NO
08	68-61-6-1	PETRO TEX	01	GARCIA		01-13-71	456	8500	171	NO	NO			NO
09	78-10-3-1	HUMBLE	46	PRUITT		07-15-63	478E	10993	207	NO	YES			NO
10	78-15-5-1	SHELL	01	URBANCZYK		09-17-65	410	18228	365	NO	NO			NO
11	78-15-5-2	LONE STAR	01	TOM		02-25-56	375	13960	292	NO	NO			NO

BANDERA COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	69-12-3-1	TESORO	01	HABY		12-21-74	2236	6729	123E	NO	NO			NO
02	69-12-9-1	GEN CRUDE	01	ANDERSON		11-26-55	1833	10619	165	YES	NO		+733	NO
03	69-20-2-1	MIKTON OIL	01	STELZER		03-08-52	1732	8515	150E	YES	NO		+692	NO
04	69-13-7-1	SHELL	01	LACASSE		04-03-60	1864	10012	179	YES	NO		+597	NO
05	69-20-6-1	SHELL	01	BOULTINGHOUSE		03-17-72	1433	11620	190	NO	NO			NO
06	69-21-2-1	SHELL	01	TARBUTTON		01-15-71	1819	8889	162	NO	NO			NO
07	69-22-2-1	GULF	01	WHITEHEAD		06-20-65	1750	7848	170	YES	NO		+450E	NO
08	69-15-4-1	GULF	01	BURCH		02-28-64	1717	5181	112	YES	NO		+746	NO

ATASCOSA COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE-------- TOP	THKNS	NET SAND
01										-1640	576			
02										-2451	594			
03										-2888	642			
04										-2680	567			
05										-3435	651			
06										-3760E	655			
07										-4403	620			
08	-8004E									-5280	575			
09	-10062	460								-6892E	625			
10	-14360	657								-9853	827			
11										-9876	638			

BANDERA COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE-------- TOP	THKNS	NET SAND
01														
02	+923	190		+1193										
03	+932	240		+1142										
04														
05														
06														
07	+550E	100		+930	70									
08	+897E	151E		+1127	38									

BANDERA COUNTY CONTINUED

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
09	69-15-2-2	SIGNAL OIL	01	STEVENS		01-19-68	1579	5250	68E	YES	NO			NO
10	69-15-2-1	SUNRAY	01	MONTAGUE		09-24-64	1763	4910	128	NO	NO		+813	NO
11	69-15-3-2	ROWSEY	02	ROWSEY		03-22-53	1811	5269	122	NO	YES		+741	NO
12	69-15-3-1	ROWSEY	01	ROWSEY		11-21-52	1747	6205	130	NO	NO		+807	NO
13	69-15-8-1	SHELL	01	MERRICK		11-10-69	1535	16757	248	NO	NO		+397	NO
14	69-16-8-2	TUCKER AND ROWSEY	01	EVANS		06-29-60	1375	6993	130	YES	NO		+605	NO
15	69-16-8-1	ROSSMAN (STANROSS)	01	GOODENOUGH		04-03-53	1347	4020	103	YES	NO		+507E	NO
16	69-24-301	CONTINENTAL OIL	01	PURPLE SAGE RANCH	W	11-17-73		945	100E	NO	NO			NO
17	68-09-6-1	SHELL	01	DEARMOND		01-09-73	1545	10370	156	NO	NO		-125E	NO

A-6

BASTROP COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	58-59-6-1	SKELLY AND SUNRAY	01	RAY		11-14-56	595	3930	123	NO	NO			NO
02	58-61-1-1	GILCREASE OIL	01	MURCHISON		12-06-52	576	4201		YES	NO			NO
03	58-54-4-1	BURFORD OIL	02	SANDERS		10-29-52	410E	5033	130	YES	NO			NO
04	58-54-5-1	TENNECO	01	SAWICKI		09-09-67	484	8029	194	NO	YES			NO
05	58-55-4-1	BURFORD OIL	01	SANDERS		08-15-52		5227	140	YES	NO			NO
06	58-55-6-1	HUMBLE	01	ROESENER		01-01-60		7079	134	NO	NO			NO
07	58-55-6-2	HUMBLE	01	JONES		06-08-59	557E	9810	223	YES	NO			NO
08	58-56-7-1	SHAMROCK-SEABOARD	01	ARTMAN		- -47	541E	9260		YES	NO			NO
09	58-48-7-1	WESTLAND OIL	01	MESCHKE		12-12-68	544	5000	170	NO	NO			NO
10	58-62-5-1	TENNECO	01	KAUFMANN		08-11-67	347E	6200	162	YES	YES			NO

BANDERA COUNTY CONTINUED

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE-------- TOP	THKNS	NET SAND
09														
10	+921	108		+1143	30									
11	+841	100		+1111	30									
12	+907E													
13	+655	258		+905	50									
14	+845	240E												
15														
16														
17														

BASTROP COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE-------- TOP	THKNS	NET SAND
01	-2645									-1093	354			
02	-2964									-1174	407			
03										-4650				
04										-5272	234			
05														
06														
07										-6748	240			
08										-6282	247			
09														
10										-3870	652			

BASTROP COUNTY CONTINUED

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
11	58-62-8-1	JACKSON	01	PRICE		10-12-51	350E	5000E	132	YES	NO			NO
12	58-62-6-1	FRED SHIELD	01	CURRY		06-18-65	405	5762	146	YES	NO			NO
13	58-63-2-1	HALBOUTY-BINTLIFF	01	JACKSON		10-21-65	381E	5747	139	NO	NO			NO
14	58-64-1-1	TEXACO	01	BROWDER		08-24-70	470	9184	200	NO	NO			NO
15	58-63-6-1	BYARS AND REVETO	01	HILL		11-14-57	401	7040	180	YES	NO			NO
16	67-06-1-1	MILLER	01	A.L. ALEXANDER		12-13-49		4207	138	YES	NO			NO
17	67-05-6-1	CANNAN	01	DINGES		09-03-57		4047	137	NO	NO			NO
18	67-06-7-2	CARRL OIL	01	SEGEL		07-03-60	512	7021	168	NO	NO			NO
19	67-06-7-1	GENERAL CRUDE	01	J. J. OTT		02-24-54	515	8208	152	YES	NO			NO

BELL COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	58-02-1-1	DUNNAM	01	HUNT		07-09-54	799	3559	116	YES	NO			NO
02	58-05-9-1	TEXAS WATER WELLS	02	CITY OF HOLLAND	W	02-28-57	545	2421	110	NO	NO			NO
03	58-14-9-1	J.L.MEYERS	02	BMF WATER SUPPLY	W	07-26-75	435E	2825		NO	NO			NO
04	40-61-401	J.L. MYERS	04	CITY OF BELTON		09-30-48	519	1171		NO	NO			NO
05	40-61-504	J.L. MYERS + SONS	02	BRAZOS RIV EL CO		01-15-49	500	1240		NO	NO			NO
06	40-61-901	WEST TEXAS TOOLS	01	TAYLORS VALLEY	W	07-31-74	525	1590		NO	NO			NO
07	40-62-801	J.L. MYERS	01	BCID		04-16-60	614	2360		NO	NO			NO
08	40-62-102	TEXAS WATER WELLS	01	R.WILSON PLASTICS	W	11-02-65	700	1822		NO	NO			NO
09	40-62-101	J.L. MYERS	04	CITY OF TEMPLE	W	10-23-51	754	2130	110	NO	NO			NO
10	40-53-902	J.L. MYERS	02	TEMPLE AIRPORT	W	01-31-52	670	1355	110	NO	NO			NO

BASTROP COUNTY CONTINUED

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE--------- TOP	THKNS	NET SAND
11										-4120	380			
12										-4775	414			
13										-4009	370			
14										-6296	403			
15										-6471				
16														
17														
18	-6553E									-4238	370			
19	-6785	907								-4406	387			

BELL COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE--------- TOP	THKNS	NET SAND
01														
02	-1625	251		-1365	28					-365	158			
03	-2015	375		-1737	38					-688	172			
04	-491	161		-361	60									
05	-667	73	41	-435	65	46								
06				-985	40					-115				
07	-1596	150		-1326	70					-346				
08	-950	172		-760	75					165				
09	-1096	280	134	-851	57	37				109				
10	-505	95	77	-330	50	35								

BELL COUNTY CONTINUED

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATF OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
11	40-54-401	WEST TEX TOOLS	01	PENDLETON WSC		07-09-65	790	1658		NO	NO			NO
12	40-45-903	A.B. JOHNSON	01	HOWARD		02-14-51	740			NO	NO			NO
13	58-01-301	E.A.DUNNAN	01	J. HUNT		06-06-58	915	1244	90	NO	NO		+365	NO

BEXAR COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATF OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	68-19-208	TWDB		TRINITY TEST		- -	1400	885		NO	YES		+517E	NO
02	68-34-6-1	GENERAL CRUDE	01	TALLEY		11-20-54	869	2622	110	YES	YES		-1731	NO
03	68-35-1-1	HICKOCK-REYNOLDS	01	EWERT		03-29-29		3002	110	YES	NO			NO
04	68-35-6-1	GENERAL CRUDE	01	ROGERS RANCH		10-17-54	812	5896	123	YES	YES			NO
05	68-29-5-1	RENLEE OIL	01	THEIS		09-23-55	800	2105	<100E	YES	YES		-1260	NO
06	68-30-5-1	SECURITY DRILLING	02	ENGLEMANN		04-07-55	850	2582	96	YES	NO		-1630	NO
07	68-43-3-1	PAGENKOPF	01	BLUM		- -	702	7028		YES	NO		-3878	NO
08	68-51-2-1	JOHNSON DRLG	04	EVERGREEN NURSERY	W	07-13-53	621	2061	102	NO	NO			NO
09	68-51-3-1	DRLG EXPLORATION	01	KURZ		04-13-63	599	4403	131	YES	NO			NO
10	68-52-2-1	BUR-KAN STANOLIND	01	HUBBARD		03-22-48	725	5140	140E	YES	NO			NO
11	68-44-6-2	UNION PRODUCING	01	MCKEAN		01-20-49	595	4425	131	NO	NO		-3775	NO
12	68-44-6-1	WEST PROD.	01	TIMBERLAKE		02-04-48	573	4482	144	NO	NO		-3667	NO
13	68-45-4-1	PARKER MCCUNE	01	GOAD		11-08-45	591E	4115		NO	NO			NO
14	68-45-3-1	ANDERSON PRICHARD	31	YTURRI		06-17-48	588E	4301		YES	NO		-3672	NO
15	68-46-1-1	SHUART	01	ECKERT		06-05-5		3400		YES	NO		-4497	NO
16	68-38-6-1	THOMAS DRLG	01	SCHWENN		01-24-75	566	510	91	NO	NO			NO

BELL COUNTY CONTINUED

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NET SAND
11	-640	141		-500	50					350				
12	-575	85		-370	60					490				
13	+485	120	110	+605	80	60								

BEXAR COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NET SAND
01														
02	-1371									+219	518			
03											527E			
04	-1388									+160	518			
05	-947									+590	540			
06	-1382													
07	-2828	375												
08														
09										-1500	601			
10	-3523E									-1145	580			
11	-3238	537								-950	545			
12	-3305	362								-1027	573			
13	-3419	105								-1059	555			
14	-3260	412								-968	540			
15	-3987	510									500E			
16														

BEXAR COUNTY CONTINUED

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
17	68-39-1-1	BROWN	01	SCHROEDER		06-05-65	734	3206	118	NO	NO			NO
18	68-46-3-1	ARKANSAS FUEL	01	BURKHARDT		11-30-47	563	5098	162	YES	NO			NO
19	68-39-5-1	FAIR-WOODWARD ETAL	01	LYRO		12-14-46	592E	4610	129E	NO	NO		-3843	NO
20	68-53-2-1	TENNECO	01	HERRERA		12-03-67	535	812	70E	YES	YES			NO
21	68-53-3-1	SECURITY DRGL	01	JUDSON		09-06-54		2590	106	NO	NO			NO
22	68-54-4-1	JACOBS	01	HARTL		05-06-54	433	3038	112	YES	NO			NO

BLANCO COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	57-45-304	SHELL DEVEL.	03	STRIBLING		11-29-64	1257	1268		NO	NO			NO

BOSQUE COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	40-13-302	SOUTHLAND + AM LIB	01	R.T.GREENWADE		03-23-49	664	7240		NO	NO			NO
02	40-21-101	AMER LIBERTY OIL	01	REICHERT		10-07-48	852	7705		NO	NO			NO

BEXAR COUNTY CONTINUED

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE-------- TOP	THKNS	NFT SAND
17	-2436E									-118	530			
18										-1617	520			
19	-3458	385								-1083	537			
20										-2155	592			
21														
22														

BLANCO COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE-------- TOP	THKNS	NFT SAND
01														

BOSQUF COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE-------- TOP	THKNS	NFT SAND
01	-286	190		-166	90									
02	-178E	120		-58	80									

BOWIE COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATF OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	16-19-7-1	A M SUTTON	01	J G NEWKIRK		05-29-45	390	4272		YES	NO		-3780	YES
02	16-28-5-1	J K WADLEY	01	I + B JOHNSTON		06-09-55	349	5091	132	YES	NO		-4654	YES
03	16-28-9-1	J K WADLEY	01	E BLACKMON		05-11-55	350	5548	138	NO	NO		-5110	YES
04	16-29-6-1	E G BRADHAM	01	BLANCHARD		12-30-50	348	5648	128	NO	NO		-4960	YES
05	16-46-8-1	GULF OIL	01	J VEACH		05-16-49	230	10168	213	NO	NO			YES
06	16-27-1-1	HINTON PRODUCING	01	G LIPE		06-17-72	409	6130	165	NO	NO		-5181	YES
07	16-43-1-1	TED DUNHAM	01	A M ROBERTS		06-29-62	278	5003	136	NO	NO			NO

BURLESON COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATF OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	59-26-5-1	JACKSON OIL	01	T YARRELL		04-16-58	517	6825	170	NO	NO			NO

BURNET COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATF OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	58-01-302	DUNNAM AND HENSON	01	DAY		06-10-55	909	4793	120	NO	NO		+359	NO
02	58-01-601	PARKER PETR	01	WILLIAMS		04-11-56	968	3559	110	NO	NO		+428	NO

BOWIE COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE-------- TOP	THKNS	NET SAND
01	-2920	860	376				-1605	380	165	-1545		-973	247	
02	-3386	1268	387				-1881	580	187	-1803		-1343	173	
03	-3652	808	435				-2062	602	166	-1992		-1503	147	18
04	-3462	1498	248				-1845	367	160	-1714		-1404	166	
05	-6274	2616	1127				-3810	380	48	-3712		-3178	109	23
06	-3761	700	352				-2346	225	115	-2311		-1601	238	
07							-4637	87		-4520		-3322	324	80

BURLESON COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE-------- TOP	THKNS	NET SAND
01										-6223				

BURNET COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE-------- TOP	THKNS	NET SAND
01	+459	100E												
02	+578E	150E												

CALDWELL COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	58-59-8-1	WOODWARD	01	KING		04-20-55	585	4439	124	YES	NO		-3845	NO
02	67-02-6-1	DIETZ ET AL	02	BLANKS		12-06-56	552E	3014	115	YES	NO			NO
03	67-03-7-1	BLACK	01	STRAKE		01-30-40	567	3360		YES	NO			NO
04	67-03-5-1	WOODWARD	01	TAYLOR		05-14-55	500E	4240	122	YES	NO			NO
05	67-11-1-1	GULF	02	JOHNSON		12-25-58	610	4173	130	NO	NO			NO
06	67-11-4-1	SUTTON	01	THOMPSON		01-17-60	574	4006	127	NO	NO			NO
07	67-10-9-1	ORION OIL	01	ROCHELLE		07-17-51	476	3614	122	NO	NO			NO
08	67-11-8-1	MAGNOLIA	28	TABOR		05-29-48	437	4705	119E	NO	NO			NO
09	67-11-8-2	MAGNOLIA	01	MERCER		02-21-53	489	4719	124	NO	NO			NO
10	67-20-1-2	GIBSON	01	GRAY		02-06-66	396	5659	140	YES	NO			NO
11	67-20-1-1	FAITH	01	CARTER		12-07-52	347	4769	132	YES	NO			NO
12	67-20-5-2	SMITH AND STAR	01	CROWELL		03-26-55	365	6514	144	YES	YES		-6110	NO
13	67-20-5-1	UNITED PROD.	01	WALKER		10-24-62	380	6946	157	NO	NO		-6480	NO
14	67-13-5-1	TENNECO	01	DIXON		10-06-67	596	6320	152	YES	YES			NO

CASS COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	16-54-2-1	HUMBLE OIL	01	METHODIST HOME		10-22-55	252E	10533	206	NO	NO			YES

CALDWELL COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE--------- TOP	THKNS	NET SAND
01	-3230	615								-1283	442			
02										-615	443			
03	-2573	220								-1200	403			
04	-3100	605								-1158	432			
05										-1168	534			
06										-1396	435			
07										-1444	490			
08	-3688	487								-1713	530			
09	-3716									-1586	505			
10	-4534									-2536	500			
11										-2438	518			
12	-5345	765								-2863	522			
13	-5670	810								-3172	490			
14										-3579	487			

CASS COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE--------- TOP	THKNS	NET SAND
01	-6840						-4115	371	155	-4006		-3270	263	20

COLLIN COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	18-34-8-1	T F HUNTER	01	J HILL		08-14-58	614	4311	110	NO	NO		-1670	NO
02	18-42-3-1	PURE OIL CO	01	A T FINLEY		08-16-44	707	6002		NO	NO		-2143	NO
03	18-43-2-1	O W KILLAM	01	J E HERRINGTON		12-14-49	734	6050		NO	NO		-2147	NO
04	18-43-3-1	HILL AND HILL	01	L CARRUTH		06-10-57	706	7781	138	YES	NO		-2324	NO
05	18-43-5-1	HUMBLE OIL	01	J WESTER		04-19-47	700	7852		YES	NO		-2311	NO
06	18-44-4-1	RODMAN AND NOEL	01	M I MELL		10-22-59	622	9540	147	YES	NO		-2648	NO
08	18-42-8-1	PURE OIL	01	GEORGE LIGHT		11-15-44	638	5972		YES	NO		-1791	NO
09	18-51-2-2	HUMBLE OIL	01	S G SIMS		05-16-58	595	5058	120	NO	NO		-2446	NO
10	18-51-3-1	HUMBLE OIL	01	J ATKINS		12-03-56	642	11220	185	NO	NO		-2563	NO
11	18-51-2-1	HUMBLE OIL	01	H C MILLER		02-12-54	591	11407	189	YES	YES		-2460	NO
12	18-52-4-1	LAYNE-MEYERS		CITY OF MCKINNEY	W	08-16-45	575E	3363		YES	NO			NO
13	18-50-6-1	TX POWER + LIGHT	01	TRINITY TEST		06-03-53	630	2694	115	NO	NO		-1932	NO
14	18-50-6-2	STEPHENS PETROL	01	ADAMS		05-13-52	789	7899	143	YES	NO		-2130	NO
15	18-50-8-1	STANDARD OIL	01	NEWSOME		02-15-47	750	8261	100E	YES	NO		-2021	NO
16	18-60-3-1	O W KILLAM	01	WILBURN		03-02-56	554	4219	108	YES	YES			NO
17	33-03-2-1	J L MYERS CO	01	CITY OF RICHARDSO	W	09-10-72	600E	3280		NO	NO			NO

COLLIN COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NET SAND
01	-1189	481	342				-576	314	246	-475		+324	352	116
02	-1437	706	381				-780	342	204	-715				
03	-1586	561	285				-929	249	54	-860		+4	360	199
04	-1723	601	243				-1009	380	170	-964		-76	377	186
05	-1700	611	447				-1009	381	288	-857		-80	360	151
06	-1983	665	486				-1225	483	347	-1180		-298	344	260
07	-2804	542	257				-1674	280	112	-1634		-606	493	338
08	-1241	550	434				-660	282	207	-563				
09	-1796	650	407				-1089	383	259	-1015		-156	387	105
10	-1908	655	411				-1169	381	253	-1103		-204	326	179
11	-1829	631	337				-1100	385	307	-1027		-168	356	194
12	-2170	618	207				-1395	370	260	-1356		-435	415	331
13	-1319	613	458				-670	370	297	-598		+195	315	190
14	-1553	577	216				-865	318	247	-771		+37	320	246
15	-1488	533	322				-776	354	277	-728		+91	320	158
16	-3087	579	515				-1868	283	221	-1811		-693	553	296
17	-2422	258	195				-1361	244	188	-1282		-392	390	275

COMAL COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	68-15-2-1	CORPS OF ENGINEERS		CANYON DAM FL-213		- -	1012			NO	YES			NO
02	68-16-7-1	TWDB		DX-3		05-01-72	715	432	77	NO	NO			NO
03	68-23-3-1	CITY PUBLIC SERV.	02	COMAL PLANT		01-13-56		840	100E	NO	NO			NO
04	68-11-9-1	FAIR	01	FAIR OAKS RANCH		12-10-73	1258	1008	90	NO	NO		+518	NO

CORYELL COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	40-45-201	GEN CRUDE OIL CO	01	ERNEST DAY		07-31-57	720	9270	166	NO	NO			NO

DALLAS COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	32-08-9-1	MAGNOLIA PETROL	01	TRIGG EST		06-18-55	516	10222	193	YES	YES		-1529	NO
02	33-09-4-1	LAYNE-TEXAS CO	03	CITY OF IRVING		02-07-52	493	2184	100	NO	NO		-1657	NO
03	33-03-9-1	MYERS + SONS		FED WKS AGEN DOCK		11-04-42	540E	3521		YES	NO		-3030	NO
04	33-24-3-1	MYERS + SONS	15	CTY GRAND PRAIRIE		03-07-52	550E	2067	102	NO	NO		-1500E	NO
05	33-17-1-1	N AM AVIAT-CHANCE-	01	N AM AVIATION	W	11-26-40	528	1386		NO	NO			NO
06	33-10-9-1	TX WATER WELLS INC	40	CITY OF DALLAS	W	01-08-53	429	2800	102	NO	NO		-2361	NO
07	33-12-7-2	LAYNE-TEXAS CO	02	CITY OF MESQUITE	W	12-21-40	465	2559		NO	NO			NO

COMAL COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NET SAND
01														
02														
03														
04	+618	100		+1058										

CORYELL COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NET SAND
01	-372	128	30	-275	20	10								

DALLAS COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NET SAND
01	-1234	295	212				-406	178	162	-307		+366	250	110
02	-1387	270	207				-559	162	107	-430		+288	300	117
03	-2650	380	252				-1547	200	145	-1460		-520	405	221
04	-1210	290	240				-382	222	192	-266		+145	255	127
05							-470	179	112			+361	310	218
06	-2071	290	209				-1063	193	150	-939		-114	339	257
07							-1895	194	99	-1749		-789	406	323

DALLAS COUNTY CONTINUED

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
08	33-12-7-1	MYERS + SONS	03	CITY OF MESQUITE	W	09-04-51	515	3871	116E	NO	NO			NO
09	33-25-2-1	MYERS + SONS	03	CTY- DUNCANVILLE		02-22-55	725E	2648	101	NO	NO			NO
10	33-19-8-1	MYERS + SONS	02	CTY OF HUTCHINS		09-23-47	480E	1130		NO	NO			NO
11	33-20-8-1	LAYNE-TEXAS CO	02	SEAGOVILLE INTERN		10-06-44	418	2784		NO	NO			NO
12	33-20-9-1	MYERS + SONS	02	CTY OF SEAGOVILLE		02-26-47	448	2860		NO	NO			NO
13	33-28-4-1	GUIBERSON + LUCEY	01	MOYER		01-31-43	356	4504		YES	NO		-4084	NO
14	33-27-1-1	LAYNE TEXAS CO	03	CITY OF LANCASTER	W	11-11-52	500	3226	100	NO	NO			NO
15	33-27-4-1	J+L+ MYERS	02	CITY OF WILMER		- -	475	3669		NO	NO			NO

DELTA COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	17-34-7-1	GULF OIL	01	A MERRICK		- -	518	7022	150	NO	NO		-6212E	NO
02	17-35-6-1	RICHMAN + NORRIS	01	B W BOWERS		04-15-70	481	3498	117	NO	NO			NO
03	17-36-6-1	H M NAYLOR OIL	01	A O WELCH		02-06-60	426	3546	106	NO	NO			NO
04	17-37-7-1	H M NAYLOR OIL	01	K WICHS		01-27-60	416	3904	120	NO	NO			NO
05	17-42-7-1	FREEDMAN	01	PRITCHARD		11-14-49	480	6225		NO	NO			NO
06	17-42-8-1	PAN AMER PETROL	C1	KNIGHT GAS C-1		01-16-65	467	9800	182	NO	NO			NO
07	17-42-5-1	HUGHEY + ROSS	01	H O#BRIEN		09-07-70	444	9029	195	NO	NO	KT		NO
08	17-42-9-1	TALCO ASPHALT	01	W T PEEK		10-20-41	433	4698		NO	NO			NO
09	17-43-3-1	GIBSON DRLG	01	HADDOCK		04-24-57	450E	3808	128	NO	NO			NO
10	17-43-6-1	A ERWIN + PURE OIL	01	C O THOMAS		11-02-63	400	4106	124	NO	NO			NO

DALLAS COUNTY CONTINUED

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE-------- TOP	THKNS	NET SAND
08	-3005	347	304				-1865	170	131	-1763		-830	380	225
09	-1745	178	57				-787	173	93	-645		+196	402	234
10												-356	294	127
11							-2087	190	40			-1042	390	175
12							-2232	180	150	-2145		-1108	471	252
13	-3214	870					-2028	123	83			-910	460	206
14												-240	439	130
15												-595	370	20

DELTA COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE-------- TOP	THKNS	NET SAND
01	-4172	1602	1014				-2854	309		-2815		-1603	559	181
02							-2751	268	216	-2702		-1564	467	109
03							-2824	296	193	-2789		-1634	510	219
04							-3066	422	190	-3022		-1848	498	184
05	-5507	238					-4225	245	178	-4141		-2687	650	315
06	-5371	2612	1794				-4150	245		-4088		-2695	619	176
07	-7138	529	243				-5338	490	393	-5266		-3346	770	386
08							-4159	106	80	-4083		-2562	710	318
09							-3230	128	125	-3135		-1895	525	213
10							-3632	74	47	-3582		-2282	568	186

DEWITT COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	67-61-4-1	SHELL OIL	01	C S BROWN		04-11-70	378	18009	383	NO	YES			NO

DIMMIT COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	76-48-8-1	GULF OIL	01	H FITZSIMMONS		05-16-59	713	10653	262	NO	NO			NO
02	77-35-2-1	PAN AMER PETROL	01	R M BOWMAN		02-12-67	517	11837	270	NO	NO			NO
03	77-43-2-1	WESTERN NAT GAS	01	H A DILLION		01-29-54	625E	13013	300	NO	NO			NO

EDWARDS COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	70-15-1-1	HUMBLE OIL	01	COLLINS		12-11-52	2264	7319	141	YES	NO		+764	NO
02	70-08-3-1	PIERCE-DEHLINGER	01	SCHOOLFIELD		10-19-73	2278	3098		NO	NO			NO
03	70-16-3-1	TUCKER DRLG	01	REAVIS		09-28-61	1673	6525	132	NO	NO		+703E	NO
04	70-16-5-1	HUNT OIL	01	ALLISON		05-30-48	1893E	6512		NO	NO		+823	NO
05	70-24-4-1	PHILLIPS PETROL.	01	CARSON		07-02-54	1673	9767	171	YES	NO		+583	NO

DEWITT COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	-----HENSEL/RODESSA----- TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	---------PALUXY---------- TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	---------WOODBINE-------- TOP	WOODBINE THKNS	WOODBINE NET SAND
01	-17142									-13222				

DIMMIT COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	-----HENSEL/RODESSA----- TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	---------PALUXY---------- TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	---------WOODBINE-------- TOP	WOODBINE THKNS	WOODBINE NET SAND
01										-5982	867			
02	-11136									-6668	847			
03										-7525	815			

EDWARDS COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	-----HENSEL/RODESSA----- TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	---------PALUXY---------- TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	---------WOODBINE-------- TOP	WOODBINE THKNS	WOODBINE NET SAND
01	+924	160		+1004	27									
02														
03														
04	+973	150		+1115										
05	+676	93		+823	40									

ELLIS COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	32-40-2-1	JOHNNY MITCHELL	01	J.L. RUSH		08-01-53	662	4069	120	NO	NO			NO
02	32-40-3-1	J.L. MYERS	01	TEXAS INDUSTRIES	W	12-09-59	678		93	NO	NO			NO
03	33-33-1-1	J.L. MYERS	03	MIDLOTHIAN	W	05-07-57	746	2415	92	NO	NO			NO
04	33-27-8-1	FAULDS WHITEHEAD	01	CURTISS HILL		01-15-60	415	3630	120	NO	NO			NO
05	33-36-1-2	R. HEBER SMITH	01	BARRON		10-31-48				NO	NO			NO
06	33-36-1-1	AMER LIBERTY OILCO	01	MCCLAIN		02-14-54	402	4271	122	NO	NO			NO
07	33-35-6-1	J.L. MYERS	02	TOWN OF PALMER	W	- -	467	1522		NO	NO			NO
08	33-43-1-1	T.W. NOWLIN	01	CHRISTIAN		02-03-50	479	3479	130	NO	NO			NO
09	33-41-7-1	J. HICKEY OIL CO	01	MEDFORD		03-29-54	506	2310	100	NO	NO			NO
10	33-43-1-2	H.H. COEFIELD	01	CHRISTIAN		02-03-50	481	3479	130	NO	NO			NO
11	33-44-1-1	L.D. CAIN	01	F.W. PATAK		05-26-53	527	2604	115	NO	NO			NO
12	33-49-1-1	LESCO INC	01	LESAGE		10-01-44	722	2881	120	NO	NO			NO
13	33-43-9-1	AUSTEX DRLNG CO	01	J.L. CHAMPION		08-05-64	500	4253	135	NO	NO			NO
14	33-44-8-1	J.B. STODDARD	01	W.E. SMITH		12-15-42	470	5020		NO	NO			NO
15	33-45-7-1	COFFIELD-GUTHRIE		BUFORD		- -				NO	NO			NO
16	33-50-6-1	HUGHEY + CARPENTER	01	M.C. FEASTER		06-19-46	423	3007	132	NO	NO			NO

ELLIS COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	--------WOODBINE-------- TOP	THKNS	NET SAND
01							-380							
02	-1057	450		-942	50		-462			-252		368		40
03	-1134	290		-974	100			100		284		316	230	65
04	-2460	305		-2295	60		-1565	130		-1410		-495		150
05														
06	-3093	705		-2883	143		-1948	133		-1793		-873	355	120
07												-603		
08	-2661	339		-2501	55		-1751	110		-1561		-721	355	0
09	-1464	200		-1394	35		-554	100		-334		256		20
10	-2659	339		-2499	55		-1749	110		-1559		-724		0
11					70							-740		140
12	-1435			-1276			-560	130		-536		202	210	
13	-3070	390		-2720	150		-1930	110		-1710		-910	350	
14	-3270	600		-3100	40		-2250			-2080				185
15														
16	-2433	97		-2167	130		-1323	90				-457	300	60

FALLS COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	39-33-604	J.L. MYERS	01	PERRY W.S. CO	W	03-25-64	475	3651		NO	NO			NO
02	39-34-7-1	J. JACKSON + HAYS	01	HERMAN WEITING		- -	489	3447	130	NO	NO			NO
03	40-48-201	J.L. MYERS	01	GOLINDA WSC	W	06-18-57	490	2640	114	NO	NO			NO
04	40-47-602	WES TEX TOOLS	01	MOORESVILLE WSC		08-06-65	543	2603	100	NO	NO			NO
05	40-48-801	CHILTON W.W. CO	02	CITY OF CHILTON		11-19-58	465	2875	126	NO	NO			NO
06	40-56-2-1	ACE OIL + HOLBERT	01	HARRISON		11-06-50	392	1147		NO	NO			NO
07	40-56-102	KEY DRILLING CO	01	DURANGO-CEGO WSC		02-05-68	558	2768		NO	NO			NO
08	40-56-302	A+H. BELL	01	C.L. TRICE		-23-41	402	3025		NO	NO			NO
09	39-49-4-1	E. FLETCHER	01	KEYSER		01-03-51	531	1731		NO	NO			NO
10	40-64-1-1	J.L. MYERS	01	WESTPHALIA W.W.	W	04-29-59	576	2910	108	NO	NO			NO
11	40-64-7-1	A. DELCAMBRE	01	D.V. DOSKOCIL		03-31-51	566	3000	120	NO	NO			NO
12	40-64-201	HUMBLE OIL + REF	02	EMMA PIEPER		07-12-52	434	2886	109	NO	NO			NO
13	40-64-102	HUMBLE OIL + REF	01	ELEANOR CARROLL		08-16-51	450	3718	126	NO	NO			NO
14	39-57-402	DELHI-TAYLOR OIL	01	J.A. COBB		03-10-55	394	4021	122	NO	NO			NO
15	40-64-701	W.P. LUSE	01	VOLTIN		05-15-51	439	2943	110	NO	NO			NO
16	39-42-5-1	MIERS + GREENAWALT	01	O.R. GILLIAM		05-03-57				NO	NO			NO
17	39-43-4-1	MCALESTER FUEL CO	01	CONDY NICHOLS A		05-31-59	361	7119	168	NO	NO			NO
18	39-42-801	COCKBURN + ZEPHYR	01	N.D. BUIE		08-14-45	402	8924	120	NO	NO			NO
19	39-50-110	DAIL GOODSON	01	J.G. BARGANIER		09-16-47	328	4487	145	NO	NO			NO
20	39-51-7-1	HINTON PRODUCING	01	N.J. SNIDER		09-04-75	393	9492	206	NO	NO			NO
21	39-43-801	SEABOARD OIL CO	01	J.E. GREEN		06-17-48	434	6200	190	NO	NO			NO
22	39-52-1-1	W.M. BRELSFORD	01	MCHENRY-EISEN		05-05-59	514	6316	136	NO	NO			NO

FALLS COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	HENSEL/RODESSA TOP	THKNS	NET SAND	PALUXY TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	WOODBINE TOP	THKNS	NET SAND
01	-2555	255	108	-2265	80	14				-1165				
02	-2871	87	46	-2561	65	20				-1411				
03	-1875	275	190	-1650	50	30				-585				
04	-1852	192	149	-1592	65	25				-567				
05	-2150	255	140	-1855	50	18				-825				
06														
07	-2082	128	75	-1792	70	25				-744				
08	-2433	190	140	-2188	20	10				-1048				
09										-1069				
10														
11	-2374	60	40	-2074	50	25				-994				
12	-2396	56	20	-2116	60	10				-1006				
13	-2460	320	185	-2200	50	0				-1050				
14	-2946	443	310	-2671	55	8				-1496				
15	-2431	73	37	-2161	63	35				-1044				
16										-2066				
17	-4214	1365	950	-3834	85	22				-2532				
18	-3910	1695	835	-3545	75	14				-2275				
19	-3852	307	220	-3472	80	15				-2222				
20	-5212									-3362				
21	-5346	420	250	-4846	50	22				-3341				
22				-5606	170	28				-4064				

FANNIN COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATF OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURAS SIC
01	18-30-5-1	COX DRLG CORP	01	S F LESLIE		12-22-57	638	4116	113	YES	NO		-1922	NO
02	18-30-8-1	F H CALLERY INC	01	R G ROBINSON		04-01-52	706	5511	142	NO	NO		-2508	NO
03	18-39-1-1	WINNSBORO WELL SER	01	J HARTWELL		07-01-76	640E	3038	105	NO	NO			NO
04	18-32-8-1	J L MYERS# SONS	01	HAIL (DAIL) COMM	W	05-06-65	640E	3063	104	NO	NO			NO
05	17-25-8-1	H L HAWKINS	01	SHELTON		05-03-54	635	4154	111	NO	NO			NO
06	18-39-4-1	SUN OIL	01	W F TUCKER		12-20-55	663	3860	109	YES	YES		-3092	NO
07	18-39-8-1	D + D OIL CO	01	J T BRINKLEY		07-11-58	702	4073	110	NO	NO			NO
08	17-33-5-1	LAYNE-TEX CO		LADONIA WATER SUP	W	02-13-63	600E	3368	105	NO	NO			NO
09	17-17-6-1	OGERS (TAYLOR)	01	G W JONES		06-03-47	580E	3508		YES	NO			NO

FRANKLIN COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATF OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURAS SIC
01	17-46-6-1	ATLANTIC RICHFIELD	01	A TULLY		07-18-68	387	9175	195	NO	NO			YES
02	17-47-2-1	SCHNEIDER + COREY	01	M N JENNINGS		07-25-67	372	8943	180	NO	NO	KT		NO
03	17-47-3-2	SAMEDAN OIL	01	S WILLIAMS		- -69	354	8688	218	NO	NO	KT		YES
04	17-47-3-1	J B WHITE ET AL	01	W H JACKSON		10-05-42	344	9084		NO	NO			NO
05	17-47-6-1	BRADSHAW-CHAMPION	01	B SHURTLEFF EST		06-22-66	349	9681	192	NO	NO			YES
06	17-55-2-1	GENERAL CRUDE OIL	01	ARNOLD		03-21-57	391E	7048	166	NO	NO			NO
07	17-55-6-1	HUMBLE OIL	01	A JAGGERS ET AL		12-06-46	453	7459		NO	NO			NO
08	17-55-8-2	ATLANTIC REF	01	FREEMAN		09-01-51	464	7293	152	NO	NO			NO
09	17-55-7-1	PAN AMER PETROL	01	E CAUDLE		01-17-68	507	11759	230	NO	NO			NO
10	17-55-8-1	PAN AMER PETROL	01	GUTHRIE		10-07-67	479	12059	210	NO	NO			YES

FANNIN COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE--------- TOP	THKNS	NET SAND
01	-1732	190	110				-667	140	75	-600				
02	-1904	604	305				-1074	220	160	-1009		+16	520	281
03	-2150	248	140				-1207	203	125	-1165		-152	503	244
04							-2182	228E	110	-2162		-1032	552	200
05	-3225	294	250				-1967	528	454	-1932		-852	533	201
06	-2517	575	341E				-1397	250	130	-1368		-297	560	298
07	-2482	889	601				-1608	260	129	-1578		-498	410	220
08							-2478	289	129	-2439		-1253	609	0
09							-1230	410		-1220				

FRANKLIN COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE--------- TOP	THKNS	NET SAND
01	-6678	895					-4813	237	212	-4748		-3086	680	255
02	-6868	830	295				-4700	408	285	-4650		-3090	646	220
03	-6544	474	194				-4634	382	291	-4586		-3036	640	225
04	-6588	1128					-4648	518	275	-4596		-3146	560	220
05	-5901	1485	1078				-4076	193	0	-4001		-2821	442	172
06	-6491	166	128				-4537	334	275	-4511		-3129	542	267
07														
08														
09														
10	-6856	2355	1044				-4876	295	260	-4769		-3371	490	196

FRANKLIN COUNTY CONTINUED

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
11	17-63-2-1	WG POST (ATLAS REF	01	G H ANDERSON		11-23-46	491	7266	155	NO	NO			NO
12	17-62-2-1	UNION OIL OF CALIF	01	C D SOLOMON		01-08-72	508	12608	228	NO	NO			NO
13	17-62-5-1	J L HAMON	01	CHITSEY		05-12-69	418	13349	244	NO	NO			NO
14	17-63-7-1	TIDEWATER OIL		NEW HOPE 6-3-D		09-04-67	443	12434	250	NO	NO			NO
15	17-63-8-1	TIDEWATER OIL	D1	WELL RAMEY D-1		11-21-53	391	12685	248	NO	NO			YES
16	17-62-8-1	MURPHY CORR	01	WHEELER-COX		02-19-64	506	12526	226	NO	NO			NO
17	17-63-7-2	M PRAY	01	A D ROBERTS		09-26-60	484	12544	241	NO	NO			NO
18	17-62-8-2	HUMBLE OIL	01	A C RALLARD		10-09-54	488	13200	253	NO	NO			NO
19	34-07-3-1	STANDARD OIL	1A	B AWTRY		05-19-67	495	13851	256	NO	NO			NO
20	34-08-2-1	MOBIL OIL	01	G D LESTER		08-09-69	389E	14483	267	NO	NO			NO

FRANKLIN COUNTY CONTINUED

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	--------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	--------WOODBINE-------- TOP	THKNS	NET SAND
11							-5019	275	207	-4929		-3447	545	252
12	-7512	2622	1620				-5421	231	136	-5347		-3787	555	252
13	-9307	875					-5689	220	169	-5614		-3872	720	342
14														
15	-7479	2460					-5319	300	227	-5234		-3679	540	237
16														
17														
18														
19														
20	-7823	1828					-5471	310	193	-5403		-3829	533	262

FREESTONE COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	39-13-7-1	NORVEL DOUGLAS	01	A.L. MOODY		12-19-61	480		180	NO	NO			NO
02	39-14-3-1	CARDINAL DRLNG CO	01	MILLER		- -	387	7017		NO	NO			NO
03	39-21-6-1	W.C. PERRYMAN	01	BEULAH JACKSON		05-23-61	500	7382	178	NO	NO			NO
04	39-22-8-1	GIBSON	01	PHILLIPS		- -	500			NO	NO			NO
05	39-22-8-2	GIBSON DRLNG CO	01	TEAGUE WEST GAS		- -	500	7460		NO	NO			NO
06	39-22-9-1	UNION PROD CO	01	JORDAN		01-13-55	524	8606	184	NO	NO			NO
07	39-30-3-1	CONTINENTAL OIL CO	01	H.C. BROWN		02-12-65	578	14037	300	NO	NO			NO
08	39-30-9-1	HUMBLE OIL CO	01	MCWATERS		09-01-47	489	14615	156	NO	NO			NO

FRIO COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATF OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	69-61-6-1	TENNECO-PENNZOIL	01	MACHEN		07-16-69	685	6411	148	NO	YES			NO
02	69-62-6-2	AMERADA	01	HILER		04-26-55	670	6392	150	YES	NO			NO
03	69-62-6-1	TENNECO-PENNZOIL	01	GOAD		06-15-69	650	6542	143	NO	YES			NO
04	69-62-7-1	TENNECO-PENNZOIL	01	ROBERTS		09-22-69	636	7143	157	NO	YES			NO
05	77-06-1-1	TENNECO	01	MACK		03-11-68	676	8052	170	YES	YES			NO
06	77-06-2-2	MONCRIEF	01	RHEINER		08-23-68	619	8108	160	NO	NO			NO
07	77-06-2-1	MONCRIEF	02	RHEINER		11-04-68	624	7416	164	NO	YES			NO
08	69-62-9-1	TENNECO-PENNZOIL	02	GOAD		08-15-69	600	7220	166	NO	YES			NO
09	69-63-8-1	TENNECO-PENNZOIL	01	WILBECK		01-31-69	622	6899	150	YES	YES			NO
10	77-07-3-1	TENNECO	01	STOKER		11-22-67	588	7580	162	YES	YES			NO
11	69-64-5-1	TENNECO	01	SIRIANNA		02-22-68	733	6700	149	YES	YES			NO

FREESTONE COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NET SAND
01	-7140	680		-6450	240					-4490				160
02				-6043	180		-4923			-4523				130
03	-6330	552	182	-5750	190	57				-4285				100
04														
05	-6810	150		-6360	85					-4640				60
06	-7556	526		-6796	190		-5486			-5045				105
07														
08	-7941	1630		-7161	150		-5792			-52[illegible]1				70

FRIO COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NET SAND
01										-2815				
02	-5580									-2630	765			
03										-3085	785			
04										-3551	800			
05										-4325	769			
06										-4261	760			
07										-3911	760			
08														
09										-3498	785			
10										-4095	762			
11										-3196	772			

FRIO COUNTY CONTINUED

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
12	68-57-5-1	TENNECO-PENNZOIL	01	EDGAR		01-09-68	591	6347	150	NO	YES			NO
13	77-21-6-1	PAN AMER PETROL	01	BUERGER		05-24-66	622	17464	300	YES	NO			NO
14	77-14-7-1	KATZ-LONE STAR	01	CALVERT		05-27-58	552	10993	203	YES	NO			NO
15	77-14-8-1	HUMBLE	01	DOERING		12-15-48		6647	172	YES	NO			NO
16	77-14-2-1	TENNECO-PENNZOIL	01	HALFF		02-06-69	629	10204	210	NO	NO			NO
17	77-15-4-1	AMERADA	08	HALFF ET AL		- -	559E	10744		NO	NO			NO
18	77-15-3-1	COX ET AL	01	MELMS		03-31-68	549	8631	180	YES	NO			NO
19	78-01-4-1	MAGNOLIA	01	MCKINLEY		09-15-47	614	11951	218	YES	NO		-11296	NO
20	77-24-2-1	PAN AMER PETROL	01	CULPEPPER		09-24-64	504	10895	220	YES	NO			NO
21	78-09-6-1	PAN AMER PETROL	01	OPPENHEIMER-LANG		12-13-68	537	9704	200	NO	NO			NO

GONZALES COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	67-27-6-1	QUINTANA	01	SCHNABEL		10-14-51	382	7434	164	NO	NO			NO
02	67-28-2-1	QUINTANA	01	LANKIN		10-31-44	322E	9177		YES	NO			NO
03	67-21-4-1	HALBOUTY	01	MITCHELL TRUST		09-27-66	450	7565	150	NO	NO			NO
04	67-21-7-1	GULF COAST	01	JOHNSON		08-06-55	405	8079	160	YES	YES			NO
05	67-21-9-1	MOBIL	01	BUNDICK		09-22-64	402E	14286	253	YES	NO		-9738E	NO
06	67-28-6-1	MAGNOLIA	01	SPAHN		06-25-52	366	9002	196	YES	NO			NO
07	67-28-6-2	QUINTANA	01	SPAHN		02-23-46	312E	10850	236	YES	NO		-9978E	NO
08	67-51-1-1	TX GAS EXPLORATION	01	HASSELL		07-24-69	332	9602	187E	YES	NO			NO
09	67-37-7-1	QUINTANA	01	SPIECKERMAN		- -47	311E	11844	208	NO	NO			NO

FRIO COUNTY CONTINUED

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NET SAND
12										-3104	746			
13	-11063	2497								-6593	750			
14	-9918									-5908	750			
15														
16										-6211	805			
17										-5651	840			
18										-5431	819			
19	-8440	1436								-4977	779			
20										-6838	783			
21										-6330	774			

GONZALES COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NFT SAND
01	-6323	729								-3803	543			
02	-7053	1205								-4488	500			
03	-7050	59								-4550	562			
04	-7655E									-5145	547			
05	-8398	1340E								-5818	483			
06	-8264	372								-5694	526			
07	-8530	1448								-5810	530			
08										-6758	502			
09	-10689	844								-7899	515			

GONZALES COUNTY CONTINUED

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
10	67-45-6-1	SUPERIOR AND EXXON	01	MCMANUS		08-05-74	343	21646	418	NO	NO			NO

GRAYSON COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	18-11-6-1	OLSON DRILLING	01	SOUTHWESTERN LIFE		12-16-35	770	4508		YES	NO		-240	NO
02	18-17-3-1	TEXAS COMPANY	01	J MARSHALL		12-18-49	693	7885	178E	YES	NO		-832	NO
03	18-18-2-1	HOWELL + HOWELL	01	MULDER		01-18-51	679	7888	149	YES	NO		-991	NO
04	18-18-3-1	SNUGGS +NEAL	01	Q LITTLE		05-04-51	782	3627		NO	NO		-968	NO
05	18-19-3-2	SHELL OIL	01	R O BROWN		09-26-54	700E	8489	130	YES	NO		-1293	NO
06	18-19-3-1	STAR OIL	01	W A MOSER		11-09-52	721E	5427	123	NO	NO		-1309	NO
07	18-20-1-1	O LEONARD + STAR	01	D BLANKENSHIP		07-10-53	696	6539	134	YES	NO		-1309	NO
08	18-19-6-1	STANDARD OIL	01	A B O#HANLON		02-05-55	868	10316	154	NO	NO		-1212	NO
09	18-20-5-1	CONTINENTAL OIL	01	B F ARMSTRONG		07-31-57	698	10060	150	NO	NO		-1219	NO
10	18-20-6-1	A G HILL	01	IONA CARTER		07-13-55	694	6891	125	NO	NO		-1226	NO
11	18-19-9-1	STANDARD OIL	01	A MITCHELL		08-29-46	741	11539	194E	YES	NO		-1829	NO
12	18-26-1-1	SEITZ-COMEGYS-SEIT	01	W P MACKEY		11-22-52	760	3763	94	YES	NO		-1030	NO
13	18-26-4-1	SNUGGS AND COX	02	M DAVIS		03-26-55	681	3991	120	NO	NO		-1129	NO
14	18-29-8-1	H W SNOWDED	01	BRYANT		04-23-46	703	4471	122E	YES	NO		-2582	NO
15	18-36-3-1	W JR UTLEDGE	01	M WILLIAMS		- -	790	5296		YES	NO		-2670	NO
16	18-37-4-1	PAN AMER PROD CO	01	J UMPHRESS		08-08-52	664	8886	167	YES	NO		-2640	NO

GONZALES COUNTY CONTINUED

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	--------WOODBINE-------- TOP	THKNS	NET SAND
10										-3667	588			

GRAYSON COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	--------WOODBINE-------- TOP	THKNS	NET SAND
01		840	489											
02		765	376				-67			-9				
03		808	351				-183			-126			100	
04		846	477				-122			-79				
05		868	402				-425			-340		+518	386	250
06		859	342											
07	-764	545	165				-291	249	168	-235			340	285
08		538	264				-674			-587		+268	362	134
09	-847	372	143				-312	335	181	-202			429	0
10	-827	399	186				-247	386	228	-197			412	228
11		1158	464				-671			-569		+316	387	269
12	-540	490	198				-110	300	246	-65				
13	-718	411	133				-142	327	260	-101				
14	-1887	695	77				-1159	369	220	-1092		-187	390	166
15	-2290	380	130				-1324	345	170	-1218		-275	395	135
16	-2106	534	305				-1322	524	345	-1283		-356	388	234

GUADALUPE COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	68-30-3-1	STANOLIND	01	SCHMIDT		09-16-54	805E	2640	110	YES	YES		-1780	NO
02	68-31-2-1	BLUMBERG	01	SANDERS		05-16-61	772	2500	109	YES	NO			NO
03	68-31-2-2	GRAVIS	01	WEYEL		08-03-46	767E	2591	100	YES	NO			NO
04	68-24-3-1	PARSONS AND NORMAN	01	TIMMERMAN		07-12-57	618	2958	125	YES	NO			NO
05	67-09-8-1	PARSONS AND NORMAN	01	VOSS		04-16-57	567	3080	125	YES	NO			NO
06	67-10-7-2	WEINERT	01	LEHMAN		09-05-51	594	3372	126	NO	NO			NO
07	67-10-7-1	CAMP OIL ET AL	01	SCHUBERT		08-26-59	547E	2621	107	YES	NO			NO
08	67-17-9-1	HAGEN	01	CALVERT		07-17-47	560	4391	124	YES	NO		-3700	NO
09	68-40-2-2	WILSON	01	KUBELA		11-11-54	545	4012	120	YES	NO			NO
10	68-40-203	SUTTON PROD	01	KUNDE		06-02-60	525	3775	124	NO	NO			NO
11	67-26-4-1	MAGNOLIA	01	MURPHY-PFULMAN		01-05-49	509	5145	161	YES	NO		-4631	NO
12	67-26-2-1	TEX SOUTHERN OIL	01	TURNER		05-05-57	490	5431	145	NO	NO			NO
13	67-26-2-2	SUTTON	01	WEINAUG		03-17-63	532	4517	120	NO	NO			NO
14	67-26-301	DIAMOND HALF	01	BIBB		04-18-37	499	5509		YES	NO		-4941	NO
15	67-27-1-2	GULF	01	DIX		02-13-53	552	2750	110	NO	NO			NO
16	67-27-2-1	ALLEN AND SCHUMATE	01	MCEVER		11-19-62	374	5013	136	NO	NO			NO

GUADALUPE COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NET SAND
01	-1495	285	110							+415	452			
02	-1468	259	56							+450	483			
03														
04	-2054	285								-132	480			
05	-2223									-303	510			
06	-2646									-694	462			
07														
08	-3420E	280E								-1256	476			
09	-3313E	153	11							-1197	520			
10										-1266	491			
11	-4191	440								-1961	570			
12	-4480		25							-2180	555			
13										-1949	587			
14	-4416									-2126	515			
15										-1978				
16										-2761	536			

HAYS COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	57-47-6-1	RUDMAN	01	HURLBUT		08-25-70	864	4629	138	NO	NO		+554E	NO
02	57-55-7-1	SHELL OIL	01	HARWELL		02-21-56	1379	4660	135	YES	NO		+559	NO
03	58-49-114	TWDB	01	STANLEY	W	04-29-70	1120	847	78E	NO	NO			NO
04	57-63-7-1	SHELL DEV CO	01	BURNET RANCH		- -	945E	95		NO	YES			NO
05	58-49-5-1	SHELL	01	FORGY		08-10-73	1157	14020	222	NO	NO			NO
06	67-01-3-1	MCALPIN	01	LANE		11-23-68	750	1906	109	NO	NO			NO
07	67-01-5-1	MCALPIN	01	HUTSON		06-14-69	785	1500	105	NO	NO			NO
08	58-58-9-1	GILLIAM DRUG	01	ALEXANDER		12-15-48	630E	2028	110	NO	NO			NO
09	58-59-7-1	WOODWARD	01	SCHUBERT		02-10-55	584	3297	111	YES	YES			NO

HENDERSON COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	33-47-2-1	SAMEDAN OIL	01	PRITCHETT		11-24-70	384	10320	221	NO	NO	KT		NO
02	33-47-4-1	HUMPHREY + SONS	01	H B HORNSBY		11-10-53	372	6252	154	NO	NO			NO
03	33-47-4-2	C HUNT SDS (HUMPHR	01	N M THORNTON		09-06-59	368	10206	204	NO	NO	KPA		NO
04	33-46-9-1	PAN AMER OIL	01	E P HARWELL TRUST		01-12-66	294	9868	191	NO	NO			NO
05	33-47-7-1	GETTY OIL	01	W E ROUND		10-20-68	310	10009	200	NO	NO	KT		NO

HAYS COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	-----HENSEL/RODESSA----- TOP	-----HENSEL/RODESSA----- THKNS	-----HENSEL/RODESSA----- NET SAND	---------PALUXY---------- TOP	---------PALUXY---------- THKNS	---------PALUXY---------- NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	---------WOODBINE-------- TOP	---------WOODBINE-------- THKNS	---------WOODBINE-------- NET SAND
01	+716E	162E												
02	+759	200		+841	12									
03	+430E	157		+620	60									
04				+863	04									
05														
06	-970	175		-707										
07	-635	80												
08										-504	416			
09	-2233	473	206							-428	423			

HENDERSON COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	-----HENSEL/RODESSA----- TOP	-----HENSEL/RODESSA----- THKNS	-----HENSEL/RODESSA----- NET SAND	---------PALUXY---------- TOP	---------PALUXY---------- THKNS	---------PALUXY---------- NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	---------WOODBINE-------- TOP	---------WOODBINE-------- THKNS	---------WOODBINE-------- NET SAND
01	-7231	1474	986				-5124	162	78	-4916		-3176	660	289
02							-4096	162	40	-3968		-2573	587	281
03	-6017	2170	962							-4556		-2955	617	272
04	-6246	2120	1412				-4581	83	35	-4346		-2848	590	313
05		1840E	1386				-4802	203	30	-4666		-3021	641	322

HILL COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	32-47-902	HUMBLE OIL + GAS	01	ELLA FREEMAN		- -59	640			NO	NO			NO
02	32-55-303	HUNT OIL CO	01	E.W. WRIGHT		08-24-48	620			NO	NO			NO
03	32-63-701	C. STUBBLEFIELD	01	SUMNER		12-01-51	600			NO	NO			NO
04	32-64-701	TEXAS WATER WELLS	16	CITY OF HILLSBORO	W	08-30-61	680	1965		NO	NO			NO
05	33-57-402	J.L. MYERS	01	BRANDON-IRENE WSC		- -	730			NO	NO			NO
06	33-57-701	PHILLIPS PETRO CO	01	POSEY A		- -56	599			NO	NO			NO
07	40-15-201	C.M. STONER	01	MENLOW WSC		- -	604	1700	100	NO	NO			NO
08	40-08-801	J.L. MYERS	01	CITY OF ABBOTT	W	08-27-53	712	2103		NO	NO			NO
09	39-01-602	J.L. MYERS	01	CITY OF MALONE	W	04-21-63	480	2988		NO	NO			NO
10	39-09-201	J.L. MYERS	01	CITY OF PENELOPE	W	09-18-59	559	3140		NO	NO			NO
11	39-10-201	J.L. MYERS	02	CITY OF HUBBARD	W	05-28-55	627	3550	132	NO	NO			NO
12	39-09-402	WEST TEXAS TOOLS	01	CITY OF BIROME	W	09-10-65	542	3250		NO	NO			NO
13	39-10-601	SHELL OIL CO	01	E.W. BARRETT		01-16-68	580	20307	138	NO	NO			NO

HOPKINS COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	17-43-7-1	AMOCO PRODUCTION	01	M MATHERLY		05-18-74	459	9900	183	NO	NO			NO
02	17-44-4-1	MOBIL OIL	01	J MARTIN		03-16-68	476	9566	182	NO	NO			YES
03	17-44-5-1	WEILL-TUCKER-FARME	01	R TAYLOR		09-27-56	450	4680	130	NO	NO			NO
04	17-45-3-1	GREENBRIER OIL	01	H G SMITH		12-13-54	449	5004	143	NO	NO			NO
05	17-45-4-1	HINTON PROD	01	B DAVIS		08-26-71	470E	9550	190	YES	NO	KWB		NO
06	17-45-5-1	MOBIL OIL	01	M CLEMENTS		08-09-68	477	10427	190	NO	NO			NO

HILL COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NET SAND
01	-970	170		-760	90		-170			50				
02	-1000	160		-940	105		-190	105		35				
03	750	175		640	50		-25	50		250				
04	1130	155		960	110		320	50		-60		395		0
05	1650	250		1410	70		760	50		500		67		
06	-1761	350		-1571	110		-836	65		576			215	0
07	-925	170	108	-761	55	20				132				
08	-1198	193		-1028	70		-378	45		-108				
09	-2150	358		-1815	100		1210	65		925		-388	172	0
10	-2153	355		-1903	65		1198	30		888		-441	102	30
11	-2603	320	88	-2353	70	42				-1283				
12	-2388	290		-2123	55		1378	25		1068				
13	-2696	1000		-2456	50	35				-1344				

HOPKINS COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NET SAND
01	-5841	2573	1462						0	-4251		-2845	621	260
02	-6353	1566	991				-4666	549	283	-4604		-3027	667	408
03							-4194	36	36	-4140		-2707	602	265
04							-3493	318	249	-3442		-2211	512	190
05	-6018	2169	1629				-4485	404	217	-4425		-2870	671	290
06	-5533	2815	1750				-4833	360	240	-4771		-3193	558	210

HOPKINS COUNTY CONTINUED

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
07	17-45-6-1	SOHNEIDER-COREY	01	S PIERCE		02-05-74	442	9668	182	NO	NO	KPA		NO
08	17-46-7-1	COUCH OIL • HARPER	01	B HOWISON		08-27-72	375	9118	192E	NO	NO			NO
09	17-51-3-1	B F PHILLIPS	01	RHODES		11-29-51	465	7349	186	YES	NO			NO
10	17-52-2-1	J CARAWAY	01	ER EDDICK		07-14-67	428	10643	190	YES	NO			YES
11	17-53-3-1	GRELLING ESTATE	01	T WORSHAM		01-25-59	404	10450	184	NO	NO			YES
12	17-53-6-1	SOHNEIDER • COREY	01	O B PAYNE		06-13-68	410	11079	195	NO	NO			YES
13	17-58-4-1	SHAW TRUSTEE	01	LEE • THOMAS		08-09-47	530E	5860	160	YES	NO			NO
14	17-59-2-1	SUNRAY DX OIL	01	R SEAMON		12-29-63	519	12183	224	YES	NO			YES
15	17-52-8-1	MCALESTER FUEL	A1	W L HELM A-1		11-25-62	445	11812	214	YES	NO			YES
16	17-59-8-1	HINTON PROD	01	W WALKER		01-13-62	515	13469	250	YES	NO			YES
17	17-60-9-1	H PHILLIPS ET AL	01	COOK GAS UNIT		10-08-67	395	13368	242	NO	NO			YES
18	17-62-4-1	R COBB	01	P T MILLER		10-15-56	560	8560	183	NO	NO			NO
19	17-61-9-2	SUN OIL	01	L E TURNER		01-24-45	500E	8187E	180E	YES	NO			NO
20	17-61-9-1	HUMBLE OIL	06	G W MILLER		01-01-63	472E	13482	242	NO	NO			NO
21	34-06-2-1	HUMBLE OIL	01	W HR OSS		03-11-52	467	7747	166	YES	NO			NO
22	34-05-1-1	SCHNEIDER • COREY	01	M L MCLAIN		06-02-69	485	14367	264	NO	NO			YES
23	34-06-1-1	VICTORY PETROL	01	B W MCCLURE		02-06-76	491	13610	256	NO	NO			NO

HOPKINS COUNTY CONTINUED

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	--------WOODBINE-------- TOP	THKNS	NET SAND
07	-5748	1820	1218									-3192	576	430
08	-5865	2215	1598				-4455	242	221	-4404		-2903	652	365
09							-5123	391	274	-5067		-3470	665	312
10	-6102	2530	1791				-4682	370	330	-4629		-3107	645	430
11	-6286	1941	1287				-4528	328	208	-4446		-3036	580	269
12	-6520	2127	1438				-4713	386	300	-4670		-3182	599	359
13							-5182	148	127	-5080		-3382	618	442
14	-7674	1572	1130				-5403	385	225	-5362		-3691	712	317
15	-6650	3087	1984				-5141	303	228	-5095		-3503	672	326
16	-8097	1916	1339				-5927	208	120	-5795		-3970	737	244
17	-8030	2368	1736				-5917	242	182	-5857		-4115	708	356
18	-7820	180					-5712	290	260	-5661		-4002	653	382
19							-5851	469	289	-5800		-4080	670	409
20	-8056	2734	1797				-5848	355	229	-5798		-4068	685	417
21							-5737	191	134	-5630		-3943	624	333
22	-8065	2722					-5893	243	165	-5810		-4085	648	400
23	-8151	3509	1944				-5941	218	161	-5870		-4299	471	327

HUNT COUNTY

CO NO	ID NO	ORERATOR	NO	OWNER	WATER WELL	DATF OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	18-48-1-1	HUMBLE OIL	01	E ANDERSON		03-25-44	599	6271		YES	NO		-5599	NO
02	18-47-5-1	WESTMOUNT OIL	01	J M CLARK		11-20-39	670	5006	136	YES	NO		-4130	YES
03	18-55-8-1	AMERICAN LIBERTY	01	J P MCNATT		06-24-42	527E	6895		NO	NO		-6343	YES
04	18-55-8-2	HUMBLE OIL	01	L NORMAN		12-12-43	549	7157		YES	NO		-6593	YES
05	18-63-2-1	HUMBLE OIL	01	J A RUTHERFORD		09-10-43	530	7482		NO	NO		-6930	YES
06	18-63-8-1	K L MCHENRY	01	H NEELEY		07-17-46	510E	5346	170	YES	NO			NO
07	18-63-5-1	R L PEVETO	01	O B INGRAM		05-27-61	525E	7928	162	NO	NO			YES
08	33-07-8-1	SCHNEIDER-COREY	01	V DENISON		04-09-69	487	9517	197	NO	NO			YES
09	33-07-9-1	PAN AMER PETROL	01	J A COOKSEY		09-04-57	497	9501	180	NO	NO			YES

JOHNSON COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATF OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	32-37-1-1	WARREN PETROL CO	01	H.D. HANNA		07-10-55	936	3721	109	NO	NO			NO
02	32-38-2-1	SUNRAY DX OIL CO	01	S.B. FINDLEY		09-30-63	900	8165	186	NO	NO			NO
03	32-39-6-1	CHRISTIE ET AL	01	PEIKOFF		07-08-55	677	8809	231	NO	NO			NO
04	32-40-7-1	HUMBLE OIL CO	01	HASKELL DEAN		08-14-60	655	8955	178	NO	NO			NO
05	32-39-7-2	LAYNE TEXAS CO	01	CITY OF ALVARADO	W	04-19-47	760	1658		NO	NO			NO
06	32-39-7-1	C.M. STONER	01	JOHNSON COUNTY WS	W	09-28-65	700	1523	92	NO	NO			NO
07	32-45-4-1	AUSTRAL OIL CO	01	R.C. GAGE		05-14-53	878	9585	242	NO	NO			NO
08	32-37-9-1	LAYNE TEXAS CO	12	CITY OF CLEBURNE	W	03-16-58	824	1283	89	NO	NO			NO
09	32-46-2-1	SHELL OIL CO	01	B.K. GAINES		02-21-65	850	1489	92	NO	NO			NO
10	32-47-4-1	SHELL OIL CO	01	B.W. GOODWIN		- -	700	1568		NO	NO			NO

HUNT COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	-----HENSEL/RODESSA----- TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	---------PALUXY---------- TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	--------WOODBINE-------- TOP	WOODBINE THKNS	WOODBINE NET SAND
01	-3561	1710	1264				-2521	245	132	-2479		-1209	622	143
02	-2745	1335	827				-1860	435	171	-1827				
03	-4173	1515	1102				-2793	280	179	-2778			230	80
04	-4241	1597	1212				-2851	297	227	-2801		-1459	700	316
05	-4480	1490	1092				-2980	207	152	-2917		-1588	664	170
06							-3240	310	274	-3150		-1794	644	273
07	-4815	1600	1166				-3260	280	231	-3194		-1808	677	337
08	-6127	1566	1150				-4312	264	253	-4213		-2675	510	172
09	-5635	1868	1587				-3963	205	105	-3848		-2465	561	260

JOHNSON COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	-----HENSEL/RODESSA----- TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	---------PALUXY---------- TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	--------WOODBINE-------- TOP	WOODBINE THKNS	WOODBINE NET SAND
01	-124	90		56	110		496	140		724				
02	-460	120		-315	105		250			450				
03														
04	-1075	150		-725	170			140		25				
05	-770	128		-675	142		-10			210				
06	-690	120		-500	100		90	115		240				
07														
08	346	80			56		314	130		573				
09	-590			-410	105		190	110		390				
10	-780	88		-615	115		10	110		210				

KARNES COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATF OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	67-57-9-2	SHELL OIL	01	J JASKINIA		11-30-60	300	13685	292	NO	NO			NO
02	67-57-9-1	SHELL OIL	01	C G KAINER		09-29-60	332	13827	294	NO	NO			NO

KAUFMAN COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATF OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	33-14-7-1	ROCKWALL EXPLOR CO	01	M WALLACE		10-29-67	532	7715	180	NO	NO			YES
02	33-14-6-1	T HUMPHREY + SONS	01	W G NEALY		08-21-53	566E	5766	140	NO	NO			NO
03	33-15-6-2	SCHNEIDER + MURRAY	01	J JONES ESTATE		11-22-63	555	10065	200	NO	NO	KPA		YES
04	33-15-6-1	CARAWAY + RUDMAN	01	RUTLEDGE		11-13-68	575E	10016	186	NO	NO			NO
05	33-15-9-1	SUN OIL	01	J M RUTLEDGE		08-25-43	570E	10058		NO	NO			YES
06	33-15-8-1	OCCIDENTAL PETROL	01	D NICHOLSON		04-17-70	518	10109	250	NO	NO			YES
07	33-21-2-1	H L HUNT	01	J B SOWELL		09-11-54	471E	5013	144	NO	NO			NO
08	33-22-5-1	H B OWNBY DRLG	01	W W LECHNER		07-19-52	496E	5641	140	NO	NO			NO
09	33-23-5-1	W M HUGHES	01	D E JONES		11-16-74	502	10009	200	NO	NO			YES
10	33-22-6-1	ROD OIL CO	01	R A PIPER		06-30-52	424	5712	140	NO	NO			NO
11	33-23-7-2	AMIS AND VOIGHT	01	P BAXTER		05-25-69	444	9848	198	NO	YES			YES
12	33-23-7-1	W M HUGHES	01	V BILLINGS		08-17-75	474	9584	205	NO	NO			NO
13	33-23-5-2	TXL OIL CORP	01	A LISTON		10-28-61	494	10406	197	NO	NO			YES
14	33-23-9-1	SOUTHLAND ROYALTY	01	V R FROSCH		11-20-72	466	10440	218	NO	NO			NO
15	33-30-5-1	T HUMPHREY + SONS	01	KAUFMAN CO FARM		09-27-53	421E	5697	156	NO	NO			NO
16	33-30-6-1	GIBSON DRLG	01	E LUPE		04-08-57	417	5951	146	NO	NO			NO
17	33-31-8-1	BRITISH AMER PROD	01	G BECKER ESTATE		07-30-65	432	9821	200	YES	NO			YES

KARNES COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	--------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	--------WOODBINE-------- TOP	THKNS	NET SAND
01										-10660	657			
02										-10276	644			

KAUFMAN COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	--------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	--------WOODBINE-------- TOP	THKNS	NET SAND
01	-4715	1793	1036				-3268	220	80	-3173		-1889	599	273
02							-3676	250	160	-3609		-2285	584	218
03	-5952	2046	1620							-2998		-3127	701	250
04	-6434	2791	1510				-4602	278	0	-4522		-3012	641	262
05	-6075	2617	1388				-4367	185	119	-4250		-2760	648	294
06	-6862	1832	909									-2992	670	287
07	-3995	544	390E				-2667	204	57	-2589		-1445	527	207
08	-5082	63					-3539	218	42F	-3452		-2134	590	317
09	-6070	2238	1291				-4353	268	184	-4258		-2756	643	248
10							-3809	227	90	-3733		-2355	612	273
11	-5659	2184	958				-4026	225	0	-3939				
12	-5778	2148	1288				-4156	270	0	-4078		-2646	633	283
13	-6006	2118	1401				-4221	255		-4146		-2696	590	264
14	-6376	1987	1497				-4522	234		-4394		-2844	645	280
15	-5039	237	87				-3562	180	94	-3447		-2121	610	280
16	-5453	80	30				-3870	213	0	-3778		-2383	645	107
17	-5973	2465	964				-4238	184	30	-4118		-2676	622	163

KAUFMAN COUNTY CONTINUED

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
18	33-39-1-1	HUMBLE OIL	01	H L GUY		06-03-47	410	9800	203	YES	NO			NO
19	33-37-6-1	O W KILLAM	02	J B FREEMAN		09-20-49	340E	4329		NO	NO			NO
20	33-39-7-1	TENNECO OIL	01	R H CLARK		02-27-66	325E	9851	209E	NO	NO			NO
21	33-21-8-1	MYERS	02	CITY OF CRANDALL	W	- -	420	4732		NO	NO			NO
22	33-30-7-1	ALBERT SYLVESTER	01	ROBERT NASH		01-06-56	413	5612	156	NO	NO			NO
23	33-38-1-1	M.H. MARR	01	ROBERT R. NASH		01-17-52	427	5516	142	NO	NO			NO

KENDALL COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	68-01-901	MAGNOLIA	01	BELOW		09-07-53	1712	6512	118	YES	YES		+704	NO
02	68-02-807	TWDB	03			- -	1450	70		NO	YES			NO
03	68-04-206	NEWTON	01	HEIDRICK		12-31-50	1470	1040		NO	NO		+848	NO
04	68-04-505	NEWTON	01	CHECK RANCH		11-21-50	1315	2342		NO	NO		+715	NO
05	68-04-8-1	BLANCO RIVER AUTH	07	DAMSITE		- -	1140			NO	YES			NO
06	68-10-9-1	TWDB	02	TRINITY TEST		- -	1550E			NO	YES		+688E	NO
07	68-11-406	CITY OF BUERNE	07	WATERWELL	W	01-11-57	1412	890		NO	NO		+580	NO

KAUFMAN COUNTY CONTINUED

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	--------WOODBINE-------- TOP	THKNS	NET SAND
18	-5755	2455	1295				-4075	230	105	-3982		-2586	594	228
19							-2947	188	40	-2842		-1680	523	218
20	-5791	2097	1311				-4064	186	60	-3955		-2553	642	273
21					155			190						130
22	-4742			-4417	197					-3181		-1938		100
23	-4813			-4488	197			197		-3233		-1965		80

KENDALL COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	--------WOODBINE-------- TOP	THKNS	NET SAND
01	+892	188	80E	+1167	70									
02	+893													
03	+1010	162	125E	+1130	48	45E								
04	+905	198	111	+1095E	60	60								
05	+869E			+958E										
06														
07	+830E	258	90	+1062	40									

KERR COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATF OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURAS SIC
01	56-51-1-1	TUCKER DRLG	02	W.R. SCHREINER		09-26-59	2222	3571	112	NO	NO		+1272	NO
02	56-51-501	TUCKER DRLG	01	W.R. SCHREINER		10-11-53	2130	4014	115	NO	NO		+1150	NO
03	56-51-502	HUMBLE	01	W.R. SCHREINER		05-10-45	2057	3770		NO	NO		+1137E	NO
04	69-03-201	CONTINENTAL OIL	01	SCHREINER		01-03-43	2340	5665		YES	NO		+947	NO
05	69-03-501	AULD-TUCKER DRLG	01	AULD		02-08-58	2350	5972	134	NO	NO		+908	NO
06	69-03-503	WOODWARD AND CO	01	W AULD		09-26-51	2363	5932		NO	NO		+908	NO
07	69-04-601	PHILLIPS PETROL	01	WHITWORTH		08-28-45	2193	6620		NO	NO		+898	NO
08	68-06-401	TUCKER DRLG	01	FISHER		05-28-65	2236	5365	120	YES	NO			NO
09	69-06-2-1	UNION OIL OF CALIF	01	A REAL		02-21-73	2133	3072	113	NO	NO		+967	NO
10	69-06-301	E SCHMIDT ET AL	01	H REAL		01-31-52	2070	4881	136	YES	NO		+962	NO
11	56-63-502	CITY OF KERRVILLE	01	STELZER TEST WELL	W	07-14-65	1702	657		YES	NO		+1067	NO
12	56-63-608	CITY OF KERRVILLE	08	WATER WELL	W	01-22-52	1631	535		NO	NO		+1021E	NO
13	56-63-610	CITY OF KERRVILLE	10	PETERSON DR TEST	W	05-20-65	1722	672	90	YES	NO		+1117	NO
14	56-63-606	CITY OF KERRVILLE	06	WATER WELL	W	04-21-49	1683	610	98	NO	NO		+1023E	NO
15	56-64-701	CITY OF KERRVILLE		SAN ANTON RD CORE	W	05-18-63	1600	638	100	NO	NO		+988	NO
16	69-07-901	G.L. ROWSEY	01	R.B. NOWLIN		12-20-53	1695	6363	139	NO	NO		+725	NO
17	69-07-9-2	G.L. ROWSEY	02	R.B. NOWLIN		06-08-54	1670	7860	139	YES	NO		+755	NO
18	68-01-104	TUCKER DRLG	01	D. PERKINS		05-30-54	1534	3355	95	YES	YES		+812	NO

KERR COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NET SAND
01	+1362	90		+1460	38									
02	+1225	75		+1320	50									
03														
04	+1072	125	105E	+1248	78	65E								
05	+1041	133	113	+1178	48	25E								
06	+1043	135	120	+1199	56	40E								
07	+1011	113	100	+1193	82	67								
08														
09	+1063	96	90E	+1206	61	40E								
10	+1092	130	110	+1264	102	77E								
11	+1157	98	80	+1262E	65E	50E								
12	+1147	126E		+1249	58	58E								
13	+1180	63	60E	+1286	49	45E								
14	+1158	135E		+1265	50	40								
15	+1132	144	130E	+1240	45	40E								
16	+875	150	100E											
17	+948	193	178	+1105E	37									
18	+888	76												

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KINNEY COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	70-29-3-1	GULF OIL	01	G. SLATOR		08-25-63	1741	5302		YES	NO		-229E	NO
02	70-30-3-1	J. FROST	01	MOODY RANCH		06-14-69	1671	9873	181	YES	NO		-39E	NO
03	70-31-3-1	J. FROST	01	SILVER LAKES RCH		01-10-67	1892	10513	200	YES	NO		+160	NO
04	70-35-2-1	RICHARDSON OIL	01	M. ROSE		08-01-56	1215	2592	110	YES	NO		-744	NO
05	70-43-5-1	AUSTRAL OIL	01	C.B. WARDLAW		06-07-54	1043	3502	135	NO	NO			NO
06	70-44-4-1	L.M. JOSEY	01	A.F. BEIDLER		08-08-52	1036	4006	112	NO	NO			NO
07	70-37-7-1	H.R. WHARTON	01	C.C. BELCHER		02-05-66		2970	100	YES	NO			NO
08	70-38-5-1	FISH PROD CORP	01	POSTELL		01-23-52	1560	5364	142	YES	NO		-1180	NO
09	70-47-1-1	SUTTON DRLG	01	HARRISON		12-08-61	1218	4295	120	YES	NO			NO
10	70-53-6-1	ELTEX LTD	01	BEIDLER		03-04-46	1042	5137		YES	NO			NO
11	70-53-6-2	PHILLIPS PETROL	01	HOBBS		05-17-49	1047	4755		NO	NO			NO
12	70-53-3-1	USSRM COMPANY	01	L.E. HOBBS		05-13-64	1080	4275	130	YES	NO			NO
13	70-54-1-1	STRITER OIL	01	TOFT		06-14-62	1071	3041	115	YES	NO			NO
14	70-54-5-1	LEECO GAS + OIL	01	P. FRANKS		08-14-60	961	5261	135	YES	NO			NO
15	70-54-8-1	GENERAL CRUDE OIL	01	W.C. HEDRICK		05-23-61	937	7924	152	YES	NO		-4793E	NO

LAMAR COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	17-13-2-1	STRATTON-DELCAMBRE	01	J MCDONALD		03-14-50	504E	2071	102	NO	NO		-1483	NO
02	17-19-7-1	J R DILLON	01	SMILEY		05-23-52	596E	3018	120	NO	NO			NO
03	17-19-5-1	CLARK + OGG	01	M L SMILEY		06-20-44	572E	3351	124	YES	NO		-2623	NO
04	17-19-3-1	FRED JONES	01	J C GAMBILL		07-26-46	549	3020	163	NO	NO		-2391	NO

KINNEY COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE--------- TOP	THKNS	NET SAND
01	-29E													
02														
03														
04														
05	-2287									-226	243			
06	-2544	180								+326	530			
07														
08	-570E													
09	-1932E	1145												
10										-228	930			
11	-3146	562								-183	990			
12	-3015	179								-50	848			
13														
14	-3549	745								-330	834			
15	-3833	960								-458	906			

LAMAR COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE--------- TOP	THKNS	NET SAND
01	-1146	337	206				-438	508	303	-414		+314	310	34
02	-2154	268	158				-1351	293	193	-1324		-384	488	51
03	-2100	523	389				-1296	442	238	-1270		-393	405	105
04	-1851	540	368				-1146	415	255	-1086		-213	393	62

LAMAR COUNTY CONTINUED

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
05	17-21-2-1	COSDEN PETROL	01	W T ADAMS		04-04-46	503E	3050	90	YES	NO		-2317	NO
06	17-22-1-1	A + G MCCUTCHEN	01	C B ROBERTS		05-12-53	457	2418		NO	NO			NO
07	17-29-2-1	CRU PETROL CO	01	K COURSEY		04-07-52	558E	3627	118	NO	NO			NO
08	17-28-4-1	HENDERSON DRUG	01	CROWLEY		08-05-50	507	3631	110	NO	NO			NO
09	17-38-4-1	PARKER + CHAPMAN	01	D W NORRELL		07-06-61	386	6707	163	NO	NO			YES
10	17-38-8-1	HINTON PROD	01	MUSGROVE		05-01-72	374	7815	162	NO	NC			YES

LA SALLE COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	77-29-6-1	SHELL OIL	01	J.C. MATTHEWS		04-23-56	483	10744	218	NO	NO			NO
02	78-25-3-2	SKELLY OIL	01	LASALLE A		08-10-67	450	12234	231	NO	NO			NO
03	78-25-3-1	AULD AND SHIPMAN	01	M. WILSON		01-05-62	421	12500	250	NO	NO			NO
04	78-25-2-1	TIDEWATER OIL	02	M. WILSON		10-22-63	406	12516	270	NO	NO			NO
05	78-33-9-1	GULF OIL	01	MORTON TRUST ETAL		09-07-62	407	14536	306	NO	NO			NO
06	78-41-1-1	PAN AMER PETROL	01	A.M. FOERSTER		08-20-64	445	21995	404	NO	NO		-19665	NO

LAMAR COUNTY CONTINUED

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	HENSEL/RODESSA TOP	THKNS	NET SAND	PALUXY TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	WOODBINE TOP	THKNS	NET SAND
05	-1867	450	268				-1109	584	182	-1058		-247	340	60
06	-1733	228	158				-933	478	188	-893		-123	330	30
07	-2557	512	414				-1672	570	403	-1650		-720	400	115
08	-2813	310	223				-1905	528	280	-1871		-883	410	112
09	-3822	1908	1227				-2713	685	408	-2689		-1667	377	98
10	-4418	1588	1062				-3159	597	397	-3126		-2176	265	191

LA SALLE COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	HENSEL/RODESSA TOP	THKNS	NET SAND	PALUXY TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	WOODBINE TOP	THKNS	NET SAND
01										-7262	744			
02										-8390	880			
03										-8475	784			
04										-8494	725			
05														
06	-15630	1485								-10395	1010			

LEE COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	58-38-9-1	SKELLY-SUNRAY-MIDC	01	E CORNELL		04-02-57	523	6798	163	NO	YES			NO
02	58-48-8-1	SEABOARD OIL	01	P HENDRICK		01-07-46	432E	9604		YES	NO			NO
03	58-48-8-2	SUN OIL	01	R F MELDE		10-18-53	448	6910	160	YES	YES			NO

LEON COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	39-46-8-1	HUMBLE OIL•REF CO	01	JEWELL MARTIN		12-04-51	333	9560	224	NO	NO			NO

LIMESTONE COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	39-17-2-1	SPENCE • HUGHES	01	PAUL COLLINS		12-09-61	536	3187	114	NO	NO			NO
02	39-11-5-1	HENRY GOSSETT	01	OLIN REEDY		- -	513			NO	NO			NO
03	39-11-6-1	JOHNSON		JACKSON HEIRS		- -				NO	NO			NO
04	39-12-9-1	PAN AM	01	FORSYTHE		12-23-67	504	8892	180	NO	NO			NO
05	39-26-5-1	BALCONES OIL CO	01	JACKSON		03-23-29	552	3525	130	NO	NO			NO
06	39-18-9-1	J.L. MYERS	01	CITY PRARIE HILL	W	07-27-63	595	3942		NO	NO			NO
07	39-19-7-1	HUNT OIL CO		UNION CENTRAL LIC		12-01-48	550	5195	162	NO	NO			NO
08	39-19-8-1	THE TEXAS CO		W.A. KEELING		05-19-42	546	5999		NO	NO			NO

LEE COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	--------WOODBINE-------- TOP	THKNS	NET SAND
01	-4617E	1303								-2822	190			
02	-8613	559								-6213	210			
03										-6422				

LEON COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	--------WOODBINE-------- TOP	THKNS	NET SAND
01		367			240		-6487			-5899		-4982		

LIMESTONE COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	--------WOODBINE-------- TOP	THKNS	NET SAND
01										-894				10
02										-1695				
03														
04														
05	-2898			-2464						-1418		-968		0
06	-2925	422	120	-2615	25	25				-1480		-1000	130	25
07	-3315	965		-3020	60					-1833		-1280	155	12
08					170							-1494	180	0

LIMESTONE COUNTY CONTINUED

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
09	39-20-4-1	HUNT OIL CO	01	CR+GUY YELVERTON		04-30-52		5431	142	NO	NO			NO
10	39-20-1-1	ZEPHYR	02	PEBBLES		- -	512	5090		NO	NO			NO
11	39-26-6-1	FARRELL DRLNG	01	J.R. GILLIAM		10-14-41	521	4850		NO	NO			NO
12	39-27-1-1	M.M. MILLER	01	J.C. ROGERS		12-03-47	536	6168	174	NO	NO			NO
13	39-27-1-2	O.W. KILLIAM	01	W.D. STONE		11-30-54	530	4506	132	NO	NO			NO
14	39-20-8-1	A.F. TINNEY	01	A.R. REED		02-09-49	547	5414	175	NO	NO			NO
15	39-20-9-1	HUMBLE OIL+REF CO	01	L.W. ROGERS		10-07-56	505		205	NO	NO			NO
16	39-27-5-1	GULF OIL+F.BRYANT	01	BEEVILLE EST		01-24-41	506	5512		NO	NO			NO
17	39-28-2-1	BYRD-FROST+BYRD OC	01	MADDOX		10-24-51	465	5802	144	NO	NO			NO
18	39-29-4-1	B.D.K. CO	01	STANDHIRE		07-23-54	426		128	NO	NO			NO
19	39-29-3-1	GREGG-TEX GASOLINE	01	J. BAKER		02-22-47	514	8000	170	NO	NO			NO
20	39-36-1-1	HUMBLE OIL+REF CO	01	W.L.HERNSTADT EST		06-10-62	501	9052	196	NO	NO			NO
21	39-37-1-2	UNION		JACKSON		- -	405	11338		NO	NO			NO
22	39-29-7-1	MCALESTER FUEL CO	01	VESTA WILSON A		10-25-55	402	7320	168	NO	NO			NO
23	39-37-1-1	MCALESTER FUEL CO	01	J.F. JACKSON A		09-10-58	407		170	NO	NO			NO
24	39-29-9-1	P.G. LAKE INC	01	NOLAN WILEY		11-21-65	447		182	NO	NO			NO
25	39-30-7-1	H.L. HUNT	01	JAMESGIBSON HEIRS		- -	436			NO	NO			NO
26	39-38-2-1	PAN AM PETROL CO	01	E.H. WILLIAMS		03-13-66	465	14288	298	NO	NO			NO
27	39-35-8-1	LONE STAR PROD CO	01	BILLY CRISWELL		10-20-51	463	7788	178	NO	NO			NO
28	39-35-9-1	FOSTER + ZEPHYR OC	01	F.P. WILSON		- -	528	8390	178	NO	NO			NO
29	39-36-9-1	H.L. LONG	01	A.D. BATES ET AL		06-14-62	475	7506	178	NO	NO			NO
30	39-37-4-1	SUN OIL CO	01	CYRUS F. SMYTHE		- -	499			NO	NO			NO
31	39-44-2-1	O.W. KILLIAM	01	R.L. NANCE EST		11-23-53	463		144	NO	NO			NO
32	39-44-5-1	LOMAY + BROWN	01	J.A.REAGAN		- -	448			NO	NO			NO
33	39-45-2-1	KEY PROD	01	R.C. ARCHER		- -	487	7604		NO	NO			NO
34	39-46-1-1	MONCRIEF		MCKENZIE HEIRS		01-30-67	438		171	NO	NO			NO

LIMESTONE COUNTY CONTINUED

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	-----HENSEL/RODESSA----- TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	---------PALUXY---------- TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	--------WOODBINE-------- TOP	WOODBINE THKNS	WOODBINE NET SAND
09		131			80									12
10										-2998				
11	-3207	842	399	-2859	70	53				-1679		-1194		0
12	-3764	1078	760	-3359	85	70				-2144		-1571	160	0
13	-3770	206	155	-3400	75	50				-2155		-1572	167	0
14	-4753	114	68	-4258	80	33						-2883	250	27
15	-5145			-4590	125		-3605			-3235		-2375	300	50
16	-4369	637	356	-3869	125	35				-2844		-2206	160	12
17	-5125	210	88	-4665	30	13				-3235			246	30
18												-2890	229	28
19	-6711	775		-6006	295							-3516	380	30
20	-6244	1085	470	-5614	125	90				-3839				0
21														
22	-6188	730		-5651	167					-4143		-3248	250	15
23	-6228	665		-5613	220					-4168		-3271	256	11
24	-6693	460		-6128	165					-4503		-3553	300	20
25	-6989			-6354	263					-4699		-3704	325	40
26	-7755			-6950	290					-5175			390	25
27	-4477	1710	912	-4047	90	22				-2677		-2132		0
28	-5482	1185	890	-5147	40	25				-3722				
29	-6425	606			255					-4190		-3423	232	0
30										-4436		-3591	260	10
31	-6045	205		-5347	190					-3911		-3227	168	0
32	-6102			-5517	190							-3276		0
33					250					-4783		-3933	199	10
34				-6877	400					-5302		-4332		10

MCLENNAN COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	40-16-2-1	WES TEX TOOL CO	01	COTTONWOOD WSC	W	02-18-65	650	2366	101	NO	NO			NO
02	40-15-901	C.M. STONER	01	BOLD SPRINGS WSC	W	07-25-65	598	1874		NO	NO			NO
03	40-24-102	H.B. GLASS	01	ROSS WSC		10-25-59	568	2269	121	NO	NO			NO
04	40-24-301	LAYNE TEXAS CO	01	LEROYTOURS GERALD	W	09-18-58	495	2860	103	NO	NO			NO
05	40-24-502	J.L. MYERS	01	J.R. PATTERSON		03-16-63	485	2440		NO	NO			NO
06	40-24-704	J.L. MYERS		YOUNGBLOODFLOWERS	W	02-05-51	500	2363	115	NO	NO			NO
07	40-32-201	J.L. MYERS	01	FRANK B. TIREY	W	01-02-51	440		112	NO	NO			NO
08	39-17-401	SIMON KORSHOJ	01	R.J. FERGUSON		06-17-52	551	3977	126	NO	NO			NO
09	39-17-701	J.L. MYERS	01	CITY OF AXTELL	W	03-18-59			110	NO	NO			NO
10	40-29-103	E.J. MUTH	01	FREEMAN		10-21-50	732			NO	NO			NO
11	40-39-106	C.M. STONER	03	MIDWAY WATER CO	W	04-21-64	655	1828		NO	NO			NO
12	40-31-604	PURE MILK CO	01	GARRISON	W	05-07-57	410	2195		NO	NO			NO
13	40-39-203	J.L. MYERS	01	DR. BARNES	W	05-03-51	585	2082	116	NO	NO			NO
14	39-33-102	LAYNE TEXAS CO	02	TEX POWER + LIGHT		02-16-52	428	2850	110	NO	NO			NO
15	39-25-901	R.J. CARAWAY	01	SLAUGHTER		03-08-54	600	2240	100	NO	NO			NO
16	39-26-801	MAE BELCHER	01	E.W. SMYTH		08-14-42	531	3838		NO	NO			NO
17	40-37-902	DELTA DRILLING	01	CARL HORSTMAN		04-15-39	698	2256		NO	NO			NO
18	40-38-502	J.L. MYERS	02	TILTON J.B. TODD		06-02-50	617	1435		NO	NO			NO
19	40-38-801	C.M. STONER	01	SPRING VALLEY WSC	W	04-29-65	750	1460		NO	NO			NO
20	40-39-801	GRAY OIL CO	01	C.B.+ H.C.WARREN		10-31-50	520	1700		NO	NO			NO
21	40-40-702	WEST TEXAS TOOL	01	LEVI WSC		08-10-64	500	2541	115	NO	NO			NO
22	40-47-101	HENRY C. PAINE	01	H.C. EUBANKS		05-24-51	570	1160	109	NO	NO			NO
23	40-46-402	J.L. MYERS	02	CITY OF MOODY	W	07-06-57	775	1494	108	NO	NO			NO

MCLENNAN COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	--------WOODBINE-------- TOP	THKNS	NET SAND
01														
02	-1062	175	29	-897	33	30				76				
03	-1567	133	95	-1292	70	35				-304				
04	-1940	425	305	-1715	65	35				-695				
05	-1805	150	68	-1595	40	17				-555				
06	-1565	195	76	-1395	48	13				-403				
07	-1860			-1660	50					-620				
08	-2147	507		-1927	67	48				-909				
09														
10	-308	85			40		382							
11	-1020	153	100	-855	60	52				65				
12	-1540	245	30	-1350	50	0				-300				
13	-1258	182	144	-1055	60	30				-110				
14				-1862	50					-799				
15										-1110		-710		20
16	-3006	296	114	-2734	60	28				-1544				
17	-422	180			77									
18	-638	180			60					357				
19	-610	100	54	-482	73	41				420				
20				-1060	52	29				-112				
21	-1790	251	134	-1555	55	26				-500				
22										120				
23										475				

MCMULLEN COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	78-27-2-1	PAN AMER PETROL	01	M FRANKLIN		08-30-64	395	19636	385	NO	NO			NO
02	78-28-7-1	STANOLIND OIL	01	G W HENRY		- -49	356	14015		NO	YES			NO
03	78-42-3-1	PAN AMER PETROL	A1	ALAMO NATL BANK		04-10-65	383	21341	394	NO	NO			YES
04	78-43-4-1	PHILLIPS PETROL	A1	WASHBURN		06-20-52	339	16509	338	NO	NO			NO
05	78-43-7-1	SINCLAIR OIL	01	SO TX SYNDICATE		11-22-62	350	15100	228	NO	NO			NO
06	78-43-5-2	AMERADA PETROL	B1	M GRIMES		02-28-58	309	14405	310	NO	NO			NO
07	78-43-2-1	AMERADA PETROL	01	E CRAIG		08-07-56	316	14431	3352E	NO	NO			NO
08	78-43-5-1	AMERADA PETROL	01	M GRIMES		09-13-57	318	14889	332	NO	NO			NO
09	78-50-3-1	PHILLIPS PETROL	01	NUECES A LEASE WL		06-23-65	255	24220	485	NO	YES			YES

MCMULLEN COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NET SAND
01	-13947	1869								-9437	768			
02										-9900	962			
03	-15965	5000								-11067				
04										-11482	954			
05										-11715	834			
06										-11541	888			
07										-11446	916			
08										-11552	622			
09	-18132	3373E								-11955	1013			

MAVERICK COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATF OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	76-04-1-1	DAVIDSON BROS.	01	A F FITZPATRICK		03-23-65	879	5944	157	NO	NO			NO
02	70-62-7-1	GENERAL CRUDE OIL	01	B B DUNBAR		07-32-62	925	7257	183	YES	NO		-6285E	NO
03	76-04-8-1	S HAMMONDS	01	HENDERSON		11-18-64	791	6954	205	YES	NO			NO
04	76-05-6-1	HUMBLE OIL	01	BANDERA SCH. LDS.		03-28-56	909	13870	247	NO	YES		-12553	NO
05	76-13-4-1	SUN OIL	01	C BURR		01-11-65	866	7857	155	NO	NO			NO
06	76-13-8-1	BELCO PETROL	02	E B KINCAID		01-09-72	805	7968	218	NO	NO			NO
07	76-13-9-1	TEXAS GAS EXPLOR	01	E B KINCAID		09-18-64	895	7920	175	YES	NO			NO
08	76-14-5-1	BRACKEN OIL	01	MAGNUM		03-18-64	782	7658	215	YES	NO			NO
09	76-15-1-1	CONTINENTAL OIL	01	N CHITTIM NO. 126		05-12-64	794	7140	198	NO	NO			NO
10	76-15-5-1	CONTINENTAL OIL	02	CHITTIM *A* 152-2		05-31-64	713	8175	220	YES	NO			NO
11	76-15-7-1	CONTINENTAL OIL	01	CHITTIM 209-1		03-31-64	697	7978	212	NO	NO			NO
12	76-22-3-1	CONTINENTAL OIL	01	CHITTIM 231-1		05-11-64	729	7389	223	NO	NO			NO
13	76-22-8-1	CONTINENETAL OIL	02	CHITTIM 97-2		12-07-65	731E	9004	226	NO	NO			NO
14	76-31-8-1	UNION PRODUCTING	01	HALSELL 29-1		07-16-61	798	10512	240	YES	YES			NO

MEDINA COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATF OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	69-30-6-1	GULF OIL	01	R DEPUY		06-25-63	1292	6013	150	YES	NO			NO
02	69-38-7-2	ROXANNE OIL	01	T ROTHE RANCH		11-03-57	1117	3285	124	NO	NO		-1883	NO
03	69-38-7-1	IKE HOWETH	01	E ROTHE		10-24-60	1113	3547	120	NO	NO		-1894	NO
04	69-39-8-1	W MCCORMICK	01	J AMBERSON		08-25-49	1070	2555	110	YES	NO			NO
05	69-53-3-1	TENNECO OIL	01	W NEY		11-10-66	866	3750	124	NO	YES			NO

MAVERICK COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	--------WOODBINE-------- TOP	THKNS	NET SAND
01										-904	1197			
02	-5785									-2032	1103			
03														
04										-1559	1152			
05	-6609	382								-2217	1277			
06										-2743	1183			
07										-2805	1220			
08										-2753	915			
09														
10														
11										-2683	1280			
12										-3191	1052			
13										-3799	1278			
14	-9262	452								-4202	1300			

MEDINA COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	--------WOODBINE-------- TOP	THKNS	NET SAND
01														
02	-1603	288												
03	-1392	502	198											
04														
05										-572	702			

MEDINA COUNTY CONTINUED

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATF OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
06	69-53-6-1	FORD AND HAMILTON	01	NUNLEY		01-07-60	897	5032	128	NO	NO			NO
07	69-54-2-1	GULF OIL	01	H RICHARDSON		03-25-63	860	6956	164	NO	NO		-5750	NO
08	69-54-6-1	GINTHER-WARREN CO	01	L CARLE		06-08-66	774	4109	110	NO	NO			NO
09	69-62-1-1	TENNECO-PENZOIL	01	E HARDIE		05-13-69	695	4466	122	NO	YES			NO
10	69-47-8-1	SNOWDEN	01	HAEGELIN		06-30-46	934	4836	140	YES	NO			NO
11	69-55-5-1	PAN AMER PETROL	01	L WARD		06-08-65	732	4635	118	YES	NO			NO
12	69-55-7-1	PAN AMER PETROL	01	MUENNINK		10-22-63	745	4958	123	NO	NO			NO
13	69-63-1-1	HUMBLE OIL	01	E WILSON		01-10-49	715	7166	178E	YES	NO		-6265	NO
14	69-55-8-1	TENNECO OIL	01	R WILSON		07-06-67	678	4769	118E	NO	YES			NO
15	69-55-9-1	O R CLARK	01	R NIXON		03-26-77	680	2166	105	NO	NO			NO
16	69-56-5-1	FAIR INCORP	01	G MCANNELY		01-04-46	707	5516		YES	NO		-4720	NO
17	69-56-9-1	R A JOHNSTON	01	HOWARD #A#		02-11-65	784	5006	134E	NO	NO			NO
18	68-49-4-1	CITIES SERVICES	A1	G BRISCOE		02-01-72	777	4700	128	NO	NO			NO
19	68-49-5-1	HUGHES AND HUGHES	01	P KELLER		04-14-69	711	4704	130	NO	NO			NO
20	68-49-5-2	HUGHES AND HUGHES	01	R CADENHEAD		11-24-68	688	4413	128	NO	YES			NO
21	68-49-8-1	PROGRESS PETROL	01	R HAASS		01-20-56	671	5701	130	YES	NO			NO
22	68-57-1-1	L DOUGLAS	01	R WATSON		02-14-72	697	5295	134	NO	NO			NO
23	68-57-2-2	PAN AMER PETROL	01	J LILLY		12-18-66	700	5356	143	YES	NO			NO
24	68-57-2-1	PAN AMER PETROL	01	W KNIPP		12-04-65	662	5706	130	NO	NO			NO
25	68-50-4-1	HUGHES AND HUGHES	01	PLACHY		11-07-68	703	5003	125	NO	YES			NO
26	68-50-2-1	TENNECO-PENNZOIL	01	J CARROLL		10-17-69	767	4500	126	NO	YES			NO
27	68-50-8-1	TENNECO	01	POWELL		07-25-67		5120	127	YES	YES			NO
28	68-50-8-2	W A MONCRIEF	01	J COLLINS		07-28-68	767	5189	140	NO	YES			NO
29	68-34-5-1	MOORE-UNION PROD	01	A WURZBACH		04-24-45	1011	3138		YES	NO		-1853E	NO

MEDINA COUNTY CONTINUED

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	--------WOODBINE-------- TOP	THKNS	NET SAND
06	-3700	429								-853	732			
07	-3270	870								-720	678			
08										-1278	720			
09										-1970	740			
10	-3386	516	162							-916	654			
11										-1463	545			
12										-1638	646			
13	-4945	1320								-2085	670			
14										-1594	648			
15														
16	-3843	877	0							-1293	620			
17										-1646	612			
18										-1625	638			
19										-1714	690			
20										-1812	630			
21	-4737	292								-2039	610			
22										-2285	678			
23										-2320	678			
24										-2338	700			
25										-1902	637			
26										-1453	610			
27											656			
28										-2008	625			
29	-1539E	314												

MILAM COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATF OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURAS SIC
01	58-07-901	LAYNE TEXAS	01	MILAM CO WATER DT		03-20-57	510	3448	130	NO	NO			NO
02	58-16-6-1	GROGINSKI + MARCUS	01	G. BASKIN		05-25-57	242	3435	124	NO	NO			NO
03	59-01-301	RIMROCK TIDELANDS	01	W. CRAWFORD		05-08-56	342	7003	186	YES	NO			YES
04	58-23-4-1	D. HARRISON	01	A. SMITH ET AL		06-08-59	457	4556	140	NO	YES			NO
05	58-23-6-1	D. HARRISON	01	G. SCHRAM		04-08-59	432	5223	155	YES	YES		-4658	NO
06	58-23-9-1	H. HAWKINS	01	HERNANDEZ		11-10-76	370E	4036	139	NO	NO			NO
07	58-32-8-1	S. D. JOHNSON	01	SCHROPE		- -		4227		NO	NO			NO
08	58-32-2-1	PHILLIPS PETROL	01	GERALD		09-09-44	490E	4880		NO	NO			NO
09	59-17-3-1	TEXAS GULF SULPHER	01	BAKER		08-09-59	435	12597	262	NO	NO		-8935E	YES
10	59-19-2-1	SHELL OIL	01	N. ROSS		06-07-65	447	15134	312	YES	NO			YES

MORRIS COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATF OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURAS SIC
01	16-42-5-1	SUNRAY MID-CONT	01	P H PEWITT		05-11-50	268E	7501	168	NO	NO			NO
02	16-42-5-2	BARNWELL DRWL	01	BROVENTURE		12-18-68	282	10010	189	NO	NO			YES
03	16-43-8-1	W M COATS	B1	REES B-1		07-31-51	238	5011	140	NO	NO			NO
04	16-50-3-1	ABERCROMBIE MIN CO	01	MOORE-PAYNE		09-03-69	309E	10960	220	NO	NO			YES
05	16-51-1-1	MOORE + LECUNO OIL	01	C C DAVIS		09-13-61	371	11320	238	NO	NO			YES
06	16-51-4-1	FRANK TURNER	01	R M CAUSEY		08-24-63	387	11506	244	NO	NO			YES
07	16-50-9-1	MCBEE + MOORE	01	TALLEY		03-11-64	412	11710	240	NO	NO			YES
08	16-58-6-1	M T HALBOUTY	01	J JUSTISS		01-04-60	353E	12819	236	NO	NO			YES
09	16-58-5-1	MOBEE + RUDMAN	01	S TIDWELL		01-09-64	293	12807	260E	NO	NO			YES

MILAM COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE-------- TOP	THKNS	NET SAND
01	-2730	207		-2360E	20					-1243	230			
02										-2370	178			
03	-4368	1518		-3878	100					-2488	320			
04	-2943	1127E								-1448	167			
05	-3433	1225		-2886E						-1809	177			
06				-3105E	60					-2358	118			
07														
08										-3468	172			
09	-5961	2067E								-4005	172			
10	-8604	1448								-6026	123			

MORRIS COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE-------- TOP	THKNS	NET SAND
01							-4854	383	277	-4796		-3440	442	110
02	-7384	1484	902				-4896	375	293	-4830		-3470	450	135
03							-4512	260	196	-4480		-3174	506	141
04	-7206	943	487				-4671	331	100	-4636		-3431	335	20
05	-7231	1198	696				-4732	1047	374	-4699		-3572	253	21
06	-7481	1207	794				-4805	408	197	-4758		-3581	258	83
07	-7318	1820	952				-4892	298	107	-4848		-3606	287	0
08	-7885	1720	625				-5197	318	121	-5152		-3837	205	30
09	-8177	2078	1152				-5444	236	120	-5319		-3947	330	0

MORRIS COUNTY CONTINUED

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
10	35-03-3-1	PLACIB OIL	01	B E ELLISON		10-11-69	398	8502	198	NO	NO			NO

NAVARRO COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	33-53-4-1	HUNT	01	FORTSON		- -	369	6083		NO	NO			NO
02	33-53-7-1	BASIN	01	DRANE		- -	472			NO	NO			NO
03	33-55-1-1	HUMBLE OIL	01	SARAH TRAMMEL		08-06-54	295E	10260	212	YES	NO			YES
04	33-58-6-1	F.W. WILSON	01	A.A. SHEPPARD		- -	543	2511	107	NO	NO			NO
05	39-02-5-2	DOBBSON	01	DAYLE COOK		- -	495	3218		NO	NO			NO
06	39-02-5-1	RAHAL		COOK		- -	497	3462		NO	NO			NO
07	39-03-1-1	COFFIELD GUTHRIE	01	R. CLARK		03-14-52	495	3754		NO	NO			NO
08	33-60-9-1	BENZ	01	STRAIN		- -	375	6819		NO	NO			NO
09	33-61-9-1	TEXAS CO		J.N. EDENS JR.		01-16-57	425		245	NO	NO			NO
10	33-62-4-1	TEXAS CO	01	L.B. CUNNINGHAM		06-26-58	407	9346	210	NO	NO			NO
11	33-63-7-1	HUMBLE OIL	01	FN BANK CORSICANA		09-26-52	278	11774	242E	NO	NO			YES
12	39-11-3-1	BENZ OIL	01	JORDAN ET AL		- -	499	6255		NO	NO			NO
13	39-12-1-1	FALCON		KERR		- -	466	6455		NO	NO			NO
14	39-05-6-1	GENERAL CRUDE O.CO	01	ELKINS ESTATE		10-19-59	373		190	NO	NO			NO
15	39-05-8-1	TEMPLE HARGROVE	01	WALLACE		08-18-46	365	6184	185	NO	NO			NO
16	39-05-8-2	TEMPLE HARGROVE	02	WALLACE		09-28-47	365	6205		NO	NO			NO
17	39-07-4-1	LAWTON OIL	1A	G C BAKER 1-A		09-03-53	364	7653	170	NO	NO			NO

MORRIS COUNTY CONTINUED

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE-------- TOP	THKNS	NET SAND
10							-5524	158	83	-5030		-3952	120	0

NAVARRO COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE-------- TOP	THKNS	NET SAND
01	-3901									-2394				150
02	-3963									-2423				120
03	-6085	2040	1365				-4192	103	30	-3965		-2940	665	74
04												-493	245	
05	-2386	337	192	-2065	75	38								
06	-2568	108		-2168	120		-1453	70		-1183		-493	217	
07	-3005			-2615	60		-1910	75				-855		135
08	-4005									-2430		-1463		140
09										-4855		-3473	430	170
10												-3269	539	195
11	-6842	2280	1549						0	-4487		-3102	510	282
12	-3716									-2136				80
13	-3909				300									
14	-5597	1245		-4977	200									210
15	-5630	189		-4965	170							-2910		125
16	-5615	225		-4965	180									135
17	-6896	393	261						0	-4500		-3196	510	245

REAL COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	69-01-1-1	WOODWARD	01	PETERSON		11-17-51	2237	6015	130	NO	NO		+1047	NO
02	69-02-5-1	TUCKER DRLG	01	E. FRYAR		08-11-61	2326	6598	134	NO	NO		+937	NO
03	69-03-1-1	TUCKER DRLG	01	J. CHITTIM		03-26-62	2097	6255	132	NO	NO		+937	NO
04	69-03-2-1	BIRDWELL AND SON	01	H. AULD		02-09-64	2265	3515	110	NO	NO		+944	NO
05	69-10-6-1	STANOLIND OIL	01	C. KNIPPA		02-10-53	1747	8157	160	YES	NO		+832E	NO
06	69-03-7-1	HNG OIL CO	01	AULD 32-1		04-21-74	2103	7201	151	NO	NO			NO
07	69-03-8-1	MOORE EXPLOR CO	01	C. HABY		02-10-51	2032	6760	150	YES	NO		+802	NO

RED RIVER COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	17-07-5-1	WELCH PETROL CO	01	R WILLIAMS		06-24-56	383	1168	100	NO	NO		-741	NO
02	16-09-4-1	W B HINTON	01	R F LOOMIS		06-25-53	380E	1838	105	YES	NO		-1375	NO
03	17-16-9-1	J B WHITE	01	KURTH LUMBER CO		07-26-40	400E	2135		NO	NO		-1733	NO
04	16-17-2-1	GOSS DRLG CO	01	PAT BEADLE		10-14-52	402	2604	113	NO	NO			NO
05	16-19-4-1	B G BYARS	01	CHAPMANR ANCH		03-23-54	336E	3323	115	YES	NO		-2826	NO
06	17-23-8-1	FLESH + HOOTKINS	01	CATHERINE BAILEY		11-05-39	442E	3379		NO	NO		-2933	NO
07	16-25-2-1	L SKIDMORE ET AL	01	COBB		09-01-49	403E	2558	120	NO	NO			NO
08	17-30-6-1	MAGNOLIA PETROL CO	01	J M HENRY		09-26-41	462E	4780		YES	NO		-3962	NO
09	16-25-7-1	TEXAS CO	01	H O SOLOMON		08-19-44	337	6152	150	YES	NO		-5708	NO
10	16-33-5-1	SEABOARD OIL CO	01	COLINE		07-21-53	299E	7501	166	YES	NO		-7026	NO

REAL COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NFT SAND
01	+1105	58	10	+1217	45	15								
02	+1016	79												
03	+1047	110	95	+1167	30	30E								
04	+1058	114	75	+1195	50	20								
05														
06														
07	+942	140	140	+1114	30									

RED RIVER COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NFT SAND
01	-580	161	98				+23	383	273	+96				
02	-1160	215	122				-342	538	310	-290				
03	-1268	465	164				-490	402	187	-428			37	37
04	-1960	240					-833	377	319	-779		-148	264	97
05	-2364	247	113				-1197	377	149	-1074		-554	210	101
06	-2313	620	270				-1343	190	165	-1328		-483	395	50
07							-1639	358	165	-1602		-827	322	50
08	-2990	972	680				-1946	589	370	-1928		-990	400	18
09	-3953	930	432				-2453	620	315	-2403		-1498	355	50
10	-4511	1190	620				-2921	440	267	-2901		-1921	400	42

ROBERTSON COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	39-58-6-1	CONTINENTAL OIL CO	01	C.M. CAMPBELL		01-25-73	314	9702	200	NO	NO			NO
02	39-51-8-1	R.J. CARAWAY	01	HERMAN YEZAK		07-28-66	459	9589	210	NO	NO			NO
03	39-59-6-1	UNION PROD CO	01	GIBSON		01-29-53	365	8950	194	NO	NO			NO
04	39-61-7-1	SHELL OIL CO	01	D.J. HAMILTON		12-18-66	451	17686	378	YES	NO			NO
05	39-52-6-1	SKELLY OIL CO	01	G. WILLIAMS		05-14-72	492	13500	285	NO	NO			NO
06	39-45-8-2	ADOBE OIL CO	01	R.L. REAGAN		01-20-77			266	NO	NO			NO
07	39-45-8-1	MOBIL OIL CORP	01	R.L. REAGAN		08-29-67	460	14854	332	NO	NO			NO
08	39-53-6-1	HUMBLE OIL + REF	01	J.L. BLAIR		12-24-65	421	15396	350	NO	NO			NO
09	39-53-9-1	TX GAS EXPL+DUNLAP	01	MOZELLE KELLOGG		07-30-57	327E	9447	100	NO	NO			NO

ROCKWALL COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	33-06-5-1	BUSTER FARMER	01	SUSIE HERNDON		06-10-56	524	3955	122	NO	NO			NO
02	33-13-3-3	GAS PRODUCING ENT	01	A L CROSS		01-24-77	515	6914	145	NO	NO			NO
03	33-13-3-1	BASIN OPERATING CO	01	H C HODGES		12-22-75	530	6443	140	NO	NO			NO
04	33-13-3-2	ROTARY DRLG	01	B MYERS		04-05-66	495	7124	145	NO	NO		-6268E	YES
05	33-14-4-1	ROTARY DRLG	01	T A LEWIS		03-21-65	490E	7876	153	NO	NO		-6745	YES

ROBERTSON COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	-----HENSEL/RODESSA----- TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	---------PALUXY---------- TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND THKNS	--------WOODBINE-------- TOP	WOODBINE THKNS	WOODBINE NET SAND
01				-3096						-3750		-3211		0
02				-5166						-4061				
03	-7285	1300		-6605	65			70		-4945		-4285		
04				-7611	494					-6089		-5391	248	
05				-6453						-4764		-4005		0
06														
07				-6848						-5023		-4153		0
08				-7344						-5445		-4576		0
09	-8838	282		-7893	110			165		-5893		-5128		

ROCKWALL COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	-----HENSEL/RODESSA----- TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	---------PALUXY---------- TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND THKNS	--------WOODBINE-------- TOP	WOODBINE THKNS	WOODBINE NET SAND
01							-3338	93	83	-3276		-1986	550	204
02	-4213	1680	900E				-2957	202	151	-2857		-1630	535	275
03	-4175	1295	804				-2743	201	130	-2640		-1466	504	260
04	-4325	1290	1068				-2973	194	178	-2875		-1635	560	220
05	-4525	1672	1122				-3116	214	138	-3039		-1770	570	270

TARRANT COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	32-21-7-½	J.L.MYERS + SONS	01	BENBROOK DAM	W	03-20-48				NO	NO			NO
02	32-32-1-½	PETE HALL DRILLING	01	CANNON		- -		2499	111	NO	NO			NO

TARRANT COUNTY

CO	HOSSTON/TRINITY UNDIFFER			-----HENSEL/RODESSA-----			---------PALUXY----------			EDWARDS/ GOODLAND-TOP ONLY		---------WOODBINE---------		
NO	TOP	THKNS	NET SAND	TOP	THKNS	NET SAND	TOP	THKNS	NET SAND	TOP	THKNS	TOP	THKNS	NET SAND
01														
02														

TITUS COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATF OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	16-41-2-1	AMER PETROFINA CO	01	LILIENSTERN-HOFFM		01-11-59	312	7218	155	NO	NO			NO
02	16-42-1-1	CITIES SERVICE OIL	A1	BROVENTURE A-1		10-18-67	337E	9940	200	NO	NO			YES
03	16-49-7-1	HUMBLE OIL	01	C C SEARCY		02-04-45	388	12012		YES	NO			YES
04	17-64-4-1	TENNECO OIL	01	F TAYLOR		06-01-65	319	12980	244	NO	NO			NO
05	16-57-6-1	BELCO PETROL	01	I FUNK		09-06-69	371	12356	242	NO	NO			NO

TRAVIS COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATF OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	57-32-8-1	SHELL DEVEL		HENSEL RANCH		- -	825	214		NO	YES			NO
02	58-33-103	STERZING DRLG CO	01	S WHELESS		09-05-62	1220	927		NO	NO			NO
03	58-33-2-1	POWERS PROD	01	E A JONES		07-09-53		2999	100	NO	NO			NO
04	58-25-9-1	TWDB	01	TEJAS LAND + DEVL	W	04-05-72	1080	940		NO	NO			NO
05	58-34-603	TWDB	01	BALCONES COUNTRY	W	07-05-67	940	1100		NO	NO			NO
06	58-33-805	TWDB		APACHE SHORES SUB	W	04-29-68	780	720		NO	NO			NO
07	57-47-3-1	SHELL DEVEL CO	01	HAMILTON POOL		- -	830E	152		NO	YES			NO
08	57-48-1-1	SHELL DEVEL CO	02	HAMILTON POOL		- -	940E	147		NO	YES			NO
09	57-48-8-1	TWDB	02	JAMES KELLY		- -	1220	715		NO	NO			NO
10	57-48-604	TWDB		TOM JOHNSON		05-03-73	1173	1130		NO	NO			NO
11	57-48-6-1	FRED SHIELD	01	WATERWELL	W	- -52	1190	930	96	NO	NO			NO
12	57-48-9-1	FRED SHIELD	02	SHIELD RANCH		08-09-66	1060	821		NO	NO			NO
13	58-41-701	FRED W SHIELDS	01	HEADQUARTERS WW	W	10-11-67	950	628		NO	NO			NO
14	58-42-502	LAYNE TEXAS CO		ST STEPHEN SCHOOL	W	06-17-49	753	1015		NO	NO			NO

TITUS COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NET SAND
01							-4618	370	280	-4553		-3044	552	190
02	-6881	1390	717				-4833	380	150	-4783		-3335	516	110
03	-7307	2035	1248				-5107	300	165	-5054		-3599	483	110
04	-7801	2329	1676				-5381	364	186	-5163		-3731	572	218
05	-7519	1882	1140				-5240	244	215	-5109		-3734	404	193

TRAVIS COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NET SAND
01	+655			+794	74	54								
02	+458	142	90	+620	32E									
03														
04	+255	115		+405										
05	+5	165	135	+220										
06	+305	245		+460	15									
07				+709	31	29								
08				+880	46	24								
09	+567	62	22	+720	45	30								
10	+248	205		+488	55									
11	+420	158	40	+580										
12	+420	180		+526	46									
13	+427	100E												
14	+65	327	294	+295	75									

TRAVIS COUNTY CONTINUED

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
15	58-42-203	TX WATER WELLS INC	01	DAVENPORT	W	02-05-51	600	1127	99	NO	NO			NO
16	58-42-303	TX CRUSHED STONE	01	WATER WELL	W	01-11-59	790	1255		NO	NO		-415	NO
17	58-36-8-1	SINGER-LAYNE TX		CITY OF MANOR	W	06-26-74	524	3258	120	NO	NO			NO
18	58-51-1-1	TWDB		CITY OF AUSTIN	W	04-16-69	530	1629	97	NO	NO			NO
19	58-44-6-1	BREWSTER + BARTLE	01	E TUCKER		- -	608	4505		YES	NO		-3232	NO
20	58-58-3-1	MOBIL OIL	01	MINNIE BELL HEEP		03-24-69	711	2600	120	NO	NO			NO
21	58-51-8-1	G L REASON	01	EZELL		12-19-52	515	3389		YES	NO		-2565	NO
22	58-44-901	TAND OIL		BURLESON		- -49	410	1550		NO	NO			NO
23	58-45-4-1	H E GOFF	01	J LOCKWOOD		10-10-50	486	2035	110	NO	NO			NO
24	58-51-9-1	ANDERSON-PRICHARD	05	F BLOMQUIST		08-03-52	544	1519	103	NO	NO			NO
25	58-59-3-1	WOODWARD ET AL	01	NELSON		01-26-55	557	3772	117	YES	NO		-3173	NO

UVALDE COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	69-25-8-1	GULF OIL	01	ZESCH		10-02-63	1510	3669	125	YES	NO		-240	NO
02	69-27-6-1	GULF OIL	01	G C MAGRUDER		07-16-62	1537	7595	148	YES	NO		+144E	NO
03	69-28-1-1	TEXAS CO	01	C C MITCHELL ETAL		01-16-49	1669	6501		NO	NO		+397	NO
04	69-57-1-1	PAN AMER PETROL	01	W SMYTH		07-14-63	875	3465	128	YES	NO			NO
05	69-51-1-1	PAN AMER PETROL	01	N JERNIGAN		06-14-63	947	3001	110	NO	NO			NO
06	69-51-2-1	IKE HOWETH	01	F WINSLOW		05-24-60	910	3690	113	NO	NO			NO
07	69-51-5-1	PAN AMER PETROL	01	A HOUSTON		07-28-63	948	2603	110	YES	NO			NO
08	69-52-7-1	INTERNTL NUCLEAR	02	KINCAID RANCH		12-30-68	865	4415	127	NO	NO			NO

TRAVIS COUNTY CONTINUED

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE-------- TOP	THKNS	NET SAND
15	+17	325	205	+184	17									
16	-133	282	105	+40	30									
17	-2106	628	259							-656	180			
18														
19	-2422	810	387							-912	200			
20	-1469									+106	402			
21	-2020	545	283							-687	293			
22										-1110				
23										-1374				
24										-364				
25	-2515	658								-843	392			

UVALDE COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	-----HENSEL/RODESSA----- TOP	THKNS	NET SAND	---------PALUXY---------- TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	---------WOODBINE-------- TOP	THKNS	NET SAND
01	+60	300	124											
02	+345	231	44	+717E										
03	+612	215	47	+959										
04										-605	976			
05	-2053E									+967E	920			
06	-2340	440	281							+312	612			
07														
08										-765	852			

UVALDF COUNTY CONTINUED

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
09	69-52-9-1	TENNECO-PENNZOIL	01	F KINCAID ET AL		08-28-69	801	4565	142	NO	YES			NO
10	69-60-3-1	INTERNTL NUCLEAR	01	KINCAID RANCH		12-02-68	781	4890	130	YES	NO			NO
11	69-53-8-1	GORMAN DRLG	11	WOODLEY B-11		03-14-64	851	4545	102	NO	NO			NO
12	69-53-2-1	BENNET + SORELLE	01	M REHM		01-06-47	827	4490	110E	YES	NO		-3573E	NO

WILLIAMSON COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	57-24-6-1	KOPEL	01	RAGSDALE		- -51	960	1620		YES	NO		+110E	NO
02	58-09-5-1	ATLANTIC-RICHFIELD	01	LEWIS		06-09-67	900	880E	105	NO	NO		+283	NO
03	58-09-6-1	SHELL OIL	01	PURCELL		08-06-54	1064	9479	156E	NO	NO		+344	NO
04	58-09-9-1	HEWIT + DOUGHERTY	01	J W PEARSON		08-27-52	1080	9104	156	YES	NO		+230	NO
05	58-17-3-1	WILLIAM F CARR	01	M MATHER		06-08-51	993E	7506	148	YES	NO		+213	NO
06	58-18-1-1	RUSSELL	01	MCGILL		- -	1108	4331		YES	NO		+323	NO
07	58-12-1-1	W E GREEN	01	LEHAM		12-09-50	776	3064	101	YES	NO		-514	NO
08	58-12-4-2	S L CARPENTER	01	S J SEWARD		04-21-48	883	1816	108	YES	NO			NO
09	58-12-4-1	PUBLISHER PETROL	01	W BANSCH		09-26-73	888	1550	109	NO	NO			NO
10	58-26-1-1	J M WRIGHT	01	CITY OF LEANDER	W	04-18-69	985E	688	100E	NO	NO			NO
11	58-19-8-1	LAYNE TEXAS CO	02	CTY OF GEORGETOWN	W	- -	750	1691	103E	NO	NO		-512	NO
12	58-13-5-1	J L MEYERS SONS	03	CITY OF BARTLETT	W	03-03-58	600	2627	110	NO	NO			NO
13	58-21-2-1	J L MEYERS SONS	03	CITY OF GRANGER	W	09-26-56	578	2606	120	NO	NO			NO
14	58-27-8-1	L HENNA ET AL	02	ALSABROOK		03-04-48	750E	2333	102	YES	NO		-770	NO
15	58-22-4-1	PUMA OIL + GAS	01	K SIMCIK		08-19-48	530E	2130	120	YES	NO			NO

UVALDE COUNTY CONTINUED

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NET SAND
09										-1079	766			
10										-1269	832			
11										-1292	867			
12	-2973	600								-323	632			

WILLIAMSON COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NET SAND
01														
02	+422	139	119	+580	56	56								
03	+444	108	85	+694	60	60								
04														
05														
06														
07	-344	170	27	-126	90									
08	-587	158	122	-335	72					+533	140			
09	-477	145	23	-222	72	72				+566	158			
10	+337			+485E	18									
11	-467	45		-300	60					+608	178			
12	-1740	287		-1462	48					-450	160			
13	-1672	340	240	-1492	27	18				-412	150			
14	-510	260	122	-360	40	25				+645	177			
15				-1520	45	27				+470	162			

WILLIAMSON COUNTY CONTINUED

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
16	58-22-5-1	H + S OPERATING CO	01	JANAK		03-13-72	483	2672	120	NO	NO			NO
17	58-28-9-1	W M JARRELL	01	AVERY ET AL		06-03-50	657	2953	110	YES	NO		-2028	NO
18	58-29-6-1	LAYNE TEXAS CO	03	CITY OF TAYLOR	W	08-18-46	567	3335	110	NO	NO			NO
19	58-29-6-2	LAYNE TEXAS CO	05	CITY OF TAYLOR	W	06-19-71	550E	3373	128	NO	NO		-2750	NO
20	58-29-9-1	W + M DRLG	01	J HURTA		01-08-66	560E	1574		NO	NO			NO
21	58-39-1-1	FRIO PETROL CO	01	R R LAWLER		04-16-52	550E	2931	108	NO	NO			NO

WILSON COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATE OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	68-53-9-1	TENNECO-PENNZOIL	01	L.A. JASIK		10-07-69	522	6671		NO	YES			NO
02	68-54-2-1	GEN CRUDE OIL	01	TREVINO		11-26-59	465	6426	148	YES	NO			NO
03	68-62-3-1	TENNECO OIL	01	MCKENZIE		01-11-68	519	7538	162	YES	YES			NO
04	68-56-5-1	SUNRAY OIL	01	R. DONAHO		03-14-48	493	7510	168	YES	NO			NO
05	68-56-2-1	RALPH FAIR	01	TEAGUE		12-29-63	463	7494	194	YES	NO			NO
06	67-41-9-1	W. EARL ROWE	01	A. WATKINS		07-19-69	541	7554	156	NO	NO			NO
07	68-64-1-1	UNITED PRODUCTION	01	FRED JASKINIA		03-20-77	440	6377	150	NO	NO			NO
08	68-64-2-4	UNITED PRODUCTION	01	B. BIENEK		02-26-77	441	6271	149	NO	NO			NO
09	68-64-2-1	UNITED PRODUCTION	01	R.W. MALCHER		09-08-77	448	6494	153	NO	NO			NO
10	68-64-2-3	UNITED PRODUCTION	01	H. COLDEWEY		03-18-75	445	6455	166	NO	NO			NO
11	68-64-2-2	UNITED PRODUCTION	02	H. COLDEWEY		08-29-77	423	6485	166	NO	NO			NO
12	68-64-3-1	UNITED PRODUCTION	01	T. KATARA		08-02-77	405	6380		NO	NO			NO
13	67-42-5-1	QUINTANA PETROL	01	A. MOORE 1-A		07-08-45	422	9177		NO	NO		-8228	NO

WILLIAMSON COUNTY CONTINUED

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	HENSEL/RODESSA TOP	THKNS	NET SAND	PALUXY TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	WOODBINE TOP	THKNS	NET SAND
16				-1825						-857	150			
17	-1483	540	168							-143	200			
18	-2083	680	487	-1778	45					-718	167			
19	-2025	725	453	-1758	42					-646	164			
20										-910				
21														

WILSON COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	THKNS	NET SAND	HENSEL/RODESSA TOP	THKNS	NET SAND	PALUXY TOP	THKNS	NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	THKNS	WOODBINE TOP	THKNS	NET SAND
01										-3868	507			
02	-5157	804								-2864	569			
03										-4501	588			
04										-4799	411			
05										-4733	564			
06										-4746	563			
07														
08														
09														
10														
11														
12														
13	-7650	578								-5073	435			

ZAVALA COUNTY

CO NO	ID NO	OPERATOR	NO	OWNER	WATER WELL	DATF OF LOGGING	ELEV FT	DEPTH FT	BHT OR MAX F	CUTS AVAIL	CORE	HORIZ ATTEN BY FAULT	PALEO TOP	JURASSIC
01	70-64-6-1	PARK + PHILLIPS	01	FLOWERS-WARD 1-20		01-04-55	823	7290	148	YES	NO		-6417	YES
02	76-08-3-1	PHILLIPS PETROL	01	ZAVALA		08-01-53	713	7517	165	YES	NO			NO
03	76-16-4-1	SHELL OIL	01	H PLUMLY		- -53	650	14500	263	YES	NO		-12765	NO
04	76-24-1-1	SHAMROCK OIL	01	H GRIFFIN		08-02-65	656	9430	208	YES	NO			NO
05	77-10-7-1	TEXAS CO	03	NORTHEASTERN FARM		05-05-52	647E	10400	216	NO	NO			NO
06	77-02-8-1	HUMBLE OIL	02	PRYOR		07-25-46	700E	8686	180	YES	NO			NO
07	77-03-8-1	MAC PET	01	BARTLETT		08-19-69	692	8707	179	YES	NO			NO
08	69-60-7-1	ZINK ET AL	01	J VANHAM		07-25-67	766	2512	118	YES	NO			NO
09	69-61-7-1	W EARL ROWE	01	E D KINCAID		12-29-68	790	6602	130	NO	YES			NO
10	77-05-1-1	W A MONCRIEF	01	E SAWYER		11-25-68	784	7550	105	NO	NO			NO
11	77-12-8-1	MOBIL OIL	01	D B BYRNE		06-28-68	730	16152	280	NO	NO		-14970	YES

ZAVALA COUNTY

CO NO	HOSSTON/TRINITY UNDIFFER TOP	HOSSTON/TRINITY UNDIFFER THKNS	HOSSTON/TRINITY UNDIFFER NET SAND	HENSEL/RODESSA TOP	HENSEL/RODESSA THKNS	HENSEL/RODESSA NET SAND	PALUXY TOP	PALUXY THKNS	PALUXY NET SAND	EDWARDS/ GOODLAND-TOP ONLY TOP	EDWARDS/ GOODLAND-TOP ONLY THKNS	WOODBINE TOP	WOODBINE THKNS	WOODBINE NET SAND
01	-4833	1385	576							-1687	761			
02	-6427	376	142							-3207	705			
03	-9000	1680	699							-4895	945			
04										-5196	886			
05										-5761	944			
06										-3409	823			
07										-4688	887			
08														
09										-2860	850			
10										-3577	770			
11	-10395	1805								-6208	842			