THE UNIVERSITY OF TEXAS
BUREAU OF ECONOMIC GEOLOGY

TO ACCOMPANY MAP—GEOLOGIC
QUADRANGLE MAP NO. 27

GEOLOGY OF THE HYE QUADRANGLE, BLANCO, GILLESPIE, AND KENDALL COUNTIES, TEXAS

VIRGIL E. BARNES

CONTENTS

GENERAL SETTING

Hye quadrangle includes part of the southeastern Llano region and part of the eastern margin of the Edwards Plateau where most of the Plateau surface has been destroyed by erosion. In the southern part of the quadrangle a narrow lobe of the Edwards Plateau trends east-northeastward from near the southwest quadrangle corner. The area to the north is in the broad gently rolling Pedernales River basin, and that to the south is in a fairly rugged marginal part of the Blanco River drainage area.

The geology of the Hye quadrangle is shown on a U. S. Geological Survey 7½-minute topographic quadrangle map and, following the Johnson City quadrangle (Barnes, 1963), is the second geologic map in the Llano region to appear on a modern 1:24,000 scale, 20-foot contour interval base. The relief in the quadrangle is about 591 feet; elevations range from about 1,362 feet where Pedernales River leaves the quadrangle to 1,953 feet near the southwest corner of the quadrangle.

About 80 percent of the Hye quadrangle is drained by Pedernales River, mostly through two main tributaries, Williamson and Rocky Creeks, both of which have three forks—East, Middle, and West—and numerous named and unnamed tributaries. The remaining 20 percent of the quadrangle drains to Blanco River by way of Klepac Creek, Stiner Creek, Murry Branch, Roman Branch, and various unnamed branches. During the time the geology of this area was being mapped, Klepac Creek was known as North Big Creek and Stiner Creek as West Big Creek.

Hye quadrangle is high on the southeastern side of the Llano uplift. Cambrian and Ordovician rocks are represented by about 1 square mile of outcrop. Cretaceous rocks and small Quaternary surficial deposits occupy the remainder. The Cambrian and Ordovician rocks exposed in the northeastern part of the quadrangle dip southeastward at angles up to about 5°, and the relatively flat-lying Cretaceous rocks dip eastward about 10 feet per mile.

Discussion of stratigraphic, structural, economic, and geophysical problems are in cited references. This publication on the Hye quadrangle is one of a series of central Texas geologic quadrangle maps which will be compiled as topographic bases become available. An index map for geologic maps already published on planimetric bases and others planned for publication on the new topographic bases is shown with the geologic map.

During the period 1939 to 1942, the writer, assisted by Louis Dixon, mapped geologically the western one-third of the Hye quadrangle in Gillespie and Kendall counties. Mapping of the remainder of the quadrangle area, in Blanco County, was done intermittently with assistance from L. E. Warren (1942–1946) and A. R. Palmer (1947–1948). A gravity survey of the quadrangle was completed during 1946–1948 with the aid of Louis Dixon and A. R. Palmer.

GEOLOGIC FORMATIONS

PALEOZOIC ROCKS

CAMBRIAN SYSTEM (UPPER CAMBRIAN)

Wilberns Formation

San Saba Member.—After publication of the Gold quadrangle (Barnes, 1952a), North Grape Creek quadrangle (Barnes, 1952b), and Stonewall quadrangle (Barnes, 1952d), which adjoin the Hye quadrangle, Barnes and Bell (1954) proposed a change in nomenclature to bring Wilberns terminology into conformity with Ellenburger terminology. The names "Pedernales Dolomite" and "San Saba Limestone" on the map and in the text of these quadrangles are no longer used. Instead these rocks are included in the San Saba—the top member of the Wilberns Formation. Where dolomite and limestone are mapped separately, they are shown as dolomitic and calcitic facies of the San Saba Member. They are comparable in rank to the dolomitic and calcitic facies mapped in the overlying Threadgill Member, and other units of the Ellenburger Group.

In the Hye quadrangle exposed San Saba rocks are mostly dolomite and a minor amount of limestone. The base of the member is not exposed; however, coarse-grained dolomite characteristic of the middle part and fine-grained dolomite characteristic of the upper part of the member crop out in the vicinity of Pedernales River. These rocks, in the absence of fossils for dating, are assigned to the San Saba on the basis of their lithologic character and the trend of these units in adjacent quadrangles. Although unlikely, some of the outcrops mapped as San Saba could belong to the Threadgill Member of the Tanyard Formation. Both the coarse-grained and fine-grained dolomite are unfossiliferous and mostly non-cherty. Fossils in dolomite are preserved in chert and the scarcity of chert accounts for the absence of fossils.

Fine- to medium-grained dolomite in the bed of Pedernales River in the vicinity of Junction School has a petroliferous odor when freshly broken. However, the base of the Cretaceous is only a few feet from this outcrop, and therefore it is unsafe to assume that this odor is from indigenous Cambrian petroleum.

Non-fossiliferous aphanitic limestone grades laterally to dolomite in the vicinity of the LBJ Ranch, Old Junction School, and north of Old Junction School. Other outcrops seen were too small to map.

ORDOVICIAN SYSTEM (LOWER ORDOVICIAN)

ELLENBURGER GROUP

Tanyard Formation

Threadgill Member.—In the Hye quadrangle the position of the San Saba–Threadgill boundary with respect to the position of the Cambrian-Ordovician boundary is unknown because of lack of paleontologic evidence. The uppermost part of the San Saba could be Ordovician or the lower part of the Threadgill could be Cambrian. The boundary between the members, where in dolomite, is placed at the top of fine-grained dolomite above the highest Cambrian fossils and at the bottom of coarse-grained dolomite below the lowest Ordovician fossils.

Two inliers of Threadgill rocks occur about 1 mile south of Pedernales River in the vicinity of the county line. The western inlier is mostly fine-grained dolomite interbedded with thin-bedded, aphanitic white-weathering limestone on the surface of which are cross sections of *Gasconadia*, *Lytospira*, and *Ophileta* (locality 3–1A). Burrows and trails are common in the limestone. The eastern inlier is fine-grained slightly cherty dolomite containing silicified brachiopods in chert at locality 3–1B.

MESOZOIC ROCKS

CRETACEOUS SYSTEM (LOWER CRETACEOUS)

TRINITY GROUP

Shingle Hills Formation

Hensell Sand Member.—The Hensell Sand Member (Barnes, 1948) crops out along Pedernales River and the lower reaches of Williamson and Rocky Creeks. It is about 75 feet thick between the Pedernales River and Hye; to the south in the subsurface it may be thicker. The Hensell Sand rests on rocks of Cambrian and Ordovician age, including dolomitic and calcitic facies of the San Saba Member of the Wilberns Formation and of the Threadgill Member of the Tanyard Formation. Other units of the Cambrian and Ordovician are probably overlapped in the subsurface.

The Hensell varies widely in color and composition, is in general very poorly sorted, and becomes finer grained upward. It contains materials ranging from boulders, cobbles, pebbles, and granules through the various sand sizes to silt and clay. Small outcrops of well-indurated conglomerate, Kshh(c), are mostly in the vicinity of Pedernales River and rest on Paleozoic rocks. Uncemented small pebble conglomerate elsewhere in the Hensell is not mapped separately.

The Hensell is mostly gray; however, red material occurs at many levels. Farther west in Gillespie County, red material is mostly in the basal part. Coarse quartz sand is mostly restricted to the lower part of the Hensell. Where not cultivated, lower Hensell soils bear a typical dense growth of broad-leaf oak. The upper part of the Hensell Sand is much finer grained and contains abundant silt and clay; near the base of the Glen Rose some beds are calcareous.

The slightly indurated Hensell forms gentle slopes and is in part cultivated, especially in the northwestern part of the quadrangle.

Glen Rose Limestone Member.—The Glen Rose Limestone outcrop occupies about 85 to 90 percent of the Hye quadrangle. It rests directly on Paleozoic rocks in a small area east of Williamson Creek and elsewhere rests on Hensell Sand.

The Glen Rose outcrop thickness is about 350 feet; the subsurface thickness is somewhat greater in the southern part of the quadrangle where the member includes slightly older carbonate beds. It consists of alternating beds of limestone, dolomite, clay, silt, and sand or, more precisely, beds composed of various proportions and combinations of these materials. The beds vary in their resistance to erosion, producing a "stairstep" topography. The less easily eroded beds of limestone, dolomite, and, locally in its lower part, calcite-cemented sandstone form the tread of the steps, and the softer less resistant zones between form the risers.

The base of the Glen Rose Limestone is placed at the base of the lowest scarp-forming bed. In tracing the contact westward, as scarp-forming beds fade, the contact rises to the base of the next higher scarp-forming bed. Most of this contact was traced between observed points with the aid of a stereoscope.

The Glen Rose is mostly suitable to ranching, although flatter areas in the lower part are cultivated. In general, the vegetation on the Glen Rose is sparser than on other units, indicating the relative sterility of its soil.

Gulfward from the Hye quadrangle, a thin fossiliferous zone near the middle of the Glen Rose has been called the *Salenia texana* zone (George, 1947, p. 17; Whitney, 1952, p. 66). The top of this zone is characterized by a bed containing *Corbula*. Within the quadrangle *Salenia texana* was not found; however, the *Corbula* bed is fairly well developed and was traced to its termination near the western edge of the quadrangle.

The Glen Rose Limestone is not very fossiliferous in its upper part but some beds toward its base are very fossiliferous. Most of the pelecypods and gastropods in the Glen Rose are casts. Fossils from two Glen Rose collections have been identified by Dr. Ralph Imlay, of the U. S. Geological Survey, as follows:

Locality 3–3A, about half a mile airline southwest of Albert—

Nerinea sp.
Tylostoma cf. *regina* (Cragin)
Turritella sp.
Gryphaea wardi Hill and Vaughan
Trapezium? sp.
Panope? *knowltoni* (Hill)
Tapes sp.
Modiola sp.
Serpula sp.
Anatina sp.
Enallaster cf. *obliquatus* Clark
Porocystis globularis (Giebel)
Arctica medialis (Conrad)
Arctica roemeri (Cragin)
Cucullaea sp.
Trigonia sp.
Cardium? sp.
Protocardia sp.
Cyprimeria sp.
Lima wacoensis Roemer
Pecten (*Chlamys*) *stantoni* Hill
Lunatia? sp.
Gryphaea sp.
Cardita sp.

Locality 3–5B, about 3 miles airline south-southwest of Albert—

Protocardia? sp.
Modiola sp.
Tapes sp.
Serpula paluxiensis Hill
Anatina sp.
Loriola texana (Clark)
Arctica medialis (Conrad)
Ostrea sp.
Trigonia sp.
Pecten (*Neithea*) *occidentalis* Conrad
Cardita sp.
Exogyra texana Roemer

Fredericksburg Group

Included within the Fredericksburg Group in the Hye quadrangle are about 100 feet of Edwards Limestone, about 28 feet of Comanche Peak Limestone, and 12 feet of Walnut Clay. The boundaries of the units are gradational.

Walnut Clay

Walnut Clay flanks the Edwards Plateau lobe which crosses the southern part of the quadrangle; it also crops out on several plateau outliers. A thickness of 12 feet of Walnut, described below, was measured along the Albert-Blanco road and appears to be average for the thickness of the clay in the Hye quadrangle. The Walnut Clay grades upward into Comanche Peak Limestone. The contact is chosen where the rock becomes sufficiently calcareous to cause a change in slope. Within the Hye quadrangle the Walnut forms a bench wide enough to show on a 1:24,000-scale map, whereas in quadrangles to the west the outcrop belt is so narrow that it is mostly shown as a solid color line. The Walnut Clay bench, typically barren of trees, is too narrow to farm.

The lower contact of the Walnut is seldom exposed. In quadrangles to the west the upper Glen Rose surface is rusty; to the east, the surface is bored. However, in the Hye quadrangle, this surface is neither rusty nor bored. The Walnut is silty, very calcareous, yellowish-gray clay in part mottled yellowish orange. The lower half is a coquinite of *Exogyra* and other fossils, including pelecypod and gastropod casts. Fossil collections from the Walnut Clay may also contain fossils weathered out from the basal part of the overlying Comanche Peak Limestone. Fossils in two collections have been identified by Dr. Ralph Imlay, of the U. S. Geological Survey, as follows:

Locality 3–5C, about 3.25 miles airline south-southwest of Albert—

Caprinula crassifibra (Roemer)
Tylostoma regina (Cragin)
Turritella sp.
Lunatia? pedernalis (Roemer)
Turritella sp.
Protocardia sp.
Tapes cf. *aldamense* Böse
Trapezium? sp.
Panope sp.
Cyprimeria texana (Roemer)
Trigonia sp.
Arctica sp.
Brachydontes pedernalis (Roemer)
Modiola concentrice-costellata Roemer
Metengonoceras cf. *ambiguum* Hyatt
Exogyra texana Roemer
Gryphaea mucronata Gabb
Gryphaea wardi Hill and Vaughan
Gryphaea sp.
Exogyra texana Roemer var.
Enallaster texanus (Roemer)
Holectypus cf.*engerrandi* Lambert

Locality 3–6A, about 3.6 miles airline south of Albert—

Caprinula crassifibra (Roemer)
Caprinula cf. *anguis* (Roemer)
Protocardia sp.
Brachydontes pedernalis (Roemer)
Exogyra texana Roemer
Arctica? sp.
Cyprimeria texana (Roemer)
Pecten (*Neithea*) *duplicicosta* Roemer
Tylostoma sp.
Actaeonella sp.
Nerinea texana Roemer?
Aporrhais? subfusiformis (Shumard)
Lunatia? pedernalis (Roemer)
Lunatia? sp.
Holectypus cf. *engerrandi* Lambert
Toucasia patagiata (White)
Nerinea incisa Giebel
Protocardia sp.
Tapes cf. *aldamense* Böse
Isocardia sp.
Brachydontes pedernalis (Roemer)
Holectypus cf. *planatus* Roemer

Comanche Peak Limestone

Comanche Peak Limestone flanks the lobe of the Edwards Plateau which crosses the southern part of the quadrangle; it also crops out on numerous plateau outliers. The thickness of Comanche Peak Limestone within the Hye quadrangle is about 28 feet. It grades downward into the Walnut Clay and upward into the Edwards Limestone. The upper boundary is at the base of the first chert-bearing limestone bed. In a section measured along the Albert-Blanco road, the upper part of the Comanche Peak and the lower part of the Edwards Limestone are so poorly exposed that the contact could not be determined exactly. Elsewhere in the quadrangle the contact is also poorly exposed.

The Comanche Peak Limestone is softer than the overlying Edwards Limestone and forms a steep slope throughout the quadrangle. On aerial photographs the Comanche Peak Limestone on north slopes is characterized by a distinctive black band caused by a thick growth of vegetation dominated by a narrow-leaf oak identified by Cuyler (1931) as "*Quercus texana* Sargent (Texas oak)."

In part of Gillespie County where stereoscopic aerial photographic coverage was lacking, the boundaries were approximated by tracing bands of vegetation.

The lower part of the Comanche Peak Limestone is massive, nodular, argillaceous, yellowish gray, very fossiliferous, burrowed, and contains a widely distributed caprinid bed about 5 feet thick. The upper part of the Comanche Peak Limestone is bedded, in part honeycombed, somewhat less fossiliferous, appears to be somewhat harder, and ranges from yellowish gray to nearly white. No fossils were collected from the Comanche Peak within the quadrangle.

Edwards Limestone

The Edwards Limestone forms the surface of the lobe of the Edwards Plateau that crosses the southern part of the quadrangle; it also crops out on numerous plateau outliers. The Edwards Limestone probably is as much as 100 feet thick in the southwestern part of the quadrangle. Along the Albert-Blanco road 42 feet of poorly exposed Edwards was measured; description is given on pages 7–8. The base of the formation is placed at the base of the lowest chert-bearing limestone bed. In the Hye quadrangle the

Edwards is composed of limestone, dolomite, and chert. The limestone and dolomite vary widely in composition, texture, thickness of beds, and hardness, and the expression of the lithology is clearly shown on aerial photographs by bands of vegetation. The outcrop of the Edwards Limestone has an average density of vegetation greater than that of the Glen Rose Limestone, and in addition the vegetation is more distinctly banded. Above the abrupt slope of the Comanche Peak Limestone the Edwards Limestone flattens to form a gently sloping surface. The hard limestone beds weather slowly, have only a thin soil cover or are bare, and are nearly devoid of vegetation. The softer beds develop an adequate soil to support a dense growth of scrub oak identified by Cuyler (1931) as "*Quercus fusiformis* Sargent (mountain scrub oak)."

The Edwards surface is mostly rocky and above some beds is chert-strewn. Some of the chert in the Edwards Limestone is of a quality suitable for the manufacture of flint implements, and the chert in the Edwards is usually referred to as flint. Because of gentle slopes and lack of exposure of the softer beds, it is impossible to describe a complete section of Edwards within the quadrangle. No fossils were collected.

CENOZOIC ROCKS

QUATERNARY SYSTEM

Pleistocene Series

High gravel.—High gravel deposits in the vicinity of Pedernales River are probably mostly stream deposited; however, some are probably remnants of colluvial deposits once much more widely spread. The high gravel is composed chiefly of pebbles, cobbles, and finer materials including caliche. Much of the material is limestone, chert, and dolomite from the Edwards, limestone from the Comanche Peak, reworked siliceous materials from the Hensell Sand, and an occasional pebble of Paleozoic rock. The high gravel supports clumps of vegetation; live-oak mottes are common.

Recent Series

Alluvium.—Deposits of alluvium, mostly along Pedernales River and Williamson and Rocky Creeks, are composed of sand and silt at the surface and of coarser materials beneath. Narrow belts and patches of alluvium follow many of the lesser drainages in the area but are insignificant and have not been mapped. Some of the alluvium is cultivated and some supports a growth of pecan trees.

SUBSURFACE GEOLOGY

Cambrian and Ordovician rocks are exposed along Pedernales River in the northwestern part of the quadrangle and continue in the subsurface beneath the Cretaceous. Subsurface data are limited to seven samples, described from the Nixon-Dore-Power No. 1 Andrew Lindig well between depths 1,070 and 1,191 feet. The total depth of the well is reported to be 1,199 feet. The samples, all from the Wilberns Formation, are in the Bureau of Economic Geology Well Sample Library. Samples from 1,070 and 1,100 feet are dolomite of the San Saba Member, the one from 1,147 feet is probably Point Peak, and the rest are Morgan Creek Limestone.

Another well, the Nixon and Roe No. 2 Lindig, from which samples were not available, is reported by Mr. Nixon to be 900 feet deep.

It is unlikely that rocks younger than Ordovician or older than Cambrian are present immediately beneath the Cretaceous. The thickness of Cambrian and Ordovician units that may be present should be about the same as measured in nearby areas by Bridge, Barnes, and Cloud (1947), Cloud and Barnes (1948), and Barnes (1956, 1959). These thicknesses follow:

	Thickness (Feet)
Ordovician System (Ellenburger Group)	
Honeycut Formation	680
Gorman Formation	480
Tanyard Formation	650
Cambrian System	
Wilberns Formation	
San Saba Member	440
Point Peak Member	25
Morgan Creek Limestone Member	125
Welge Sandstone Member	10
Riley Formation	
Lion Mountain Sandstone Member	40
Cap Mountain Limestone Member	510
Hickory Sandstone Member	300

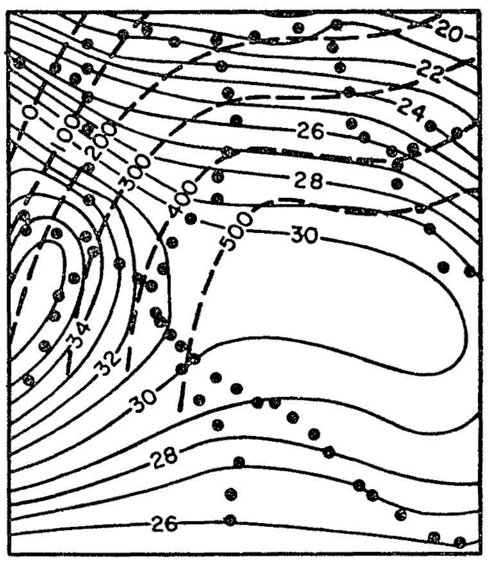

Fig. 1. Gravity and magnetic data, Hye quadrangle, Texas. Solid lines—gravitational force in milligals (relative); dashed lines—magnetic force in gammas (relative); dots—points of gravity observation.

Exposed Paleozoic rocks to the north in the North Grape Creek quadrangle (Barnes, 1952b), to be reissued as Rocky Creek quadrangle (Barnes, MS.), are faulted; their pattern beneath the Cretaceous in the Hye quadrangle may be equally complex.

Information about Precambrian rocks upon which the Paleozoic rocks lie is limited to gravity and magnetic data (Barnes, Romberg, and Anderson, 1954a, 1954b, 1955). An eastward-plunging gravity ridge trends through the middle of the quadrangle (fig. 1). The value of gravity rises sharply in the western part of the quadrangle from whence the maximum arcs southward through Stonewall quadrangle (Barnes, 1952d) and culminates in a sharp gravity maximum in the eastern part of Cain City quadrangle (Barnes, 1952c). This is the highest value of gravity observed at any point in the two-county area. North and south of the maximum, the value of gravity decreases, indicating the presence of less dense rock. In the area of exposed Precambrian rocks of the Llano uplift, large gravity minima are associated with Town Mountain granite masses (Romberg and Barnes, 1944).

Magnetic data reveal a broad magnetic high coincident with the gravity maximum in the Hye (Albert) and Miller Creek quadrangles (Barnes, Romberg, and Anderson, 1955). Unfortunately, the traverses were along flanks of this feature and do not indicate whether the maximum is sharp, as might result from a basic intrusive, or broad, as might result from Packsaddle Schist. The north-south magnetic minimum in the Stonewall quadrangle which crosses the gravity maximum may be the result of polarity set up by basic igneous masses intruded into Packsaddle Schist. In such case, the broad magnetic high in Hye (Albert) quadrangle and the sharp gravity high and offset magnetic high in Cain City quadrangle may represent basic intrusives.

MINERAL RESOURCES

The mineral resources of the quadrangle are limited to construction materials and water. Most of the soils are not suited to agriculture. The greater part of the quadrangle is ranch land.

CONSTRUCTION MATERIALS

Dimension stone.—Paleozoic rocks within the quadrangle occur either as low-lying beds along Pedernales River or in flat areas unsuited to the establishment of quarries. Limestone beds in the Threadgill Member might be used as ledgestone in building, but other outcrops do not appear to contain rock suitable for dimension stone.

In the Cretaceous, the Glen Rose contains hard limestone beds, some of which are of pleasing color and resistant to weathering. The upper part of the Comanche Peak, used for building in the Fredericksburg area, is poorly exposed, suggesting that building stone quality beds may not be present. However, since the quadrangle was mapped, a quarry has been opened at this level between Stiner and Klepac Creeks. About 100 feet of Edwards Limestone is present, and even though no beds suitable for dimension stone were seen, some may be present.

Crushed stone.—Rock in the San Saba and Threadgill Members cropping out in the northwestern part of the quadrangle is suited for crushed rock including surfacing granules but is mostly poorly situated for quarrying. Some beds in the Edwards Limestone may also be usable for crushed rock.

Sand and gravel.—Sand and gravel is scarce and confined to thin deposits of poorly sorted alluvial material along Pedernales River and a few high gravel deposits. To be of value such material should be washed and screened and the oversize crushed. Deposits of quartz sand in the Hensell have not been investigated; they should be of some use as common sand.

Road material.—An excavation 1 mile south-southwest of Rocky Community Church, labeled "gravel pit" on the topographic map, is within the area of Glen Rose outcrop. This pit was established after the quadrangle was mapped geologically. The material may be marly Glen Rose or calichified colluvium. Such material has been used for base-course material in highway construction and for surfacing secondary roads.

WATER

Ground-water surveys of Gillespie County by Shield (1937) and of Blanco County by B. A. Barnes and Cumley (1942) inventoried 40 water wells within the Hye quadrangle. Thirty-five wells are in areas of Glen Rose outcrop, and five in Hensell Sand along Pedernales River in Gillespie County bottom in Paleozoic rock. Most of the wells on Glen Rose outcrop appear to penetrate to Hensell Sand; however, some bottom in Glen Rose Limestone.

The wells range in depth from 35 to 424 feet, and at the time of measurement water stood from 14 to 200 feet below the surface. Total solids ranged from as low as 336 parts per million in a well near the river to as much as 3,173 parts per million in a well entirely in the Glen Rose. Total solids in nearly half of the wells are over a thousand parts per million; in these wells sulfate is high and chloride is low. In only a few of the wells is nitrate high.

In general, the Hensell Sand in the northern part of the quadrangle contains good water. Farther south some wells which appear to produce from the Hensell are high in total solids, especially sulfates; others are low. Some wells which appear to produce from the Glen Rose are low in total solids, while others are high. In an interfingering laterally gradational sequence of the type which exists between the

Glen Rose and Hensell, such anomalies are to be expected.

The Hickory Sandstone is water-bearing in some parts of central Texas. In the northwestern part of the Hye quadrangle the Hickory is about 1,000 feet deep, and to the south it is probably deeper. However, the fault pattern beneath the Cretaceous is unknown, and it is possible that a fault block containing shallow Hickory could be fairly near to the surface somewhere in the quadrangle.

The Welge and Lion Mountain sandstones are about 500 feet nearer to the surface; although very few wells are known to produce water from these units, the Welge at least probably carries water in places.

Some water is present locally in the rest of the Paleozoic rocks in fractures, solution channels, and perhaps in some of the slightly porous coarse-grained dolomite, but finding it will be fortuitous.

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SAMPLE DESCRIPTION

Nixon-Dore-Power No. 1 Andrew Lindig

	Depth in feet
Dolomite—finely ground, cleavage fragments indicate mostly medium to coarse grained, some fine grained, very light gray	1070
Dolomite—very fine to medium grained, very light gray, a few small specks of glauconite, some pyrite	1100
Limestone and siltstone—limestone fine grained, mostly greenish gray to light olive gray, abundant fine-grained glauconite; siltstone darker colored, argillaceous, micaceous	1147
Limestone and dolomite—limestone, very fine grained to microgranular, white to yellowish gray, glauconite scarce; dolomite very fine grained, yellowish gray	1178
Limestone—mostly fine to medium grained, greenish gray to light olive gray, glauconitic; some very fine grained to microgranular, white, almost free of glauconite	1182
Limestone—mostly microgranular to very fine grained, white to yellowish gray, sparingly glauconitic; some fine to medium grained, glauconite medium grained. Fossil is a millimeter-sized planispiral gastropod	1188
Limestone—very fine to medium grained, white to yellowish gray, in part oolitic, sparingly glauconitic	1191

STRATIGRAPHIC SECTION

Section 3.5 miles southeast of Albert, along Blanco road.

	Thickness in Feet Interval	Thickness in Feet Cumulative	Feet above base
Fredericksburg Group: 82 feet measured			
Edwards Limestone: about 42 feet measured			
1. Limestone—soft, poorly exposed.	2	2	170–172
2. Limestone—microgranular to aphanitic, white to yellowish gray, cherty, hard, in part honeycombed, in part well bedded, poorly exposed, forms bench.	10	12	160–170
3. Caliche and pulverulent limestone—lower part mostly caliche, upper part pulverulent limestone and soil.	9	21	151–160
4. Limestone—microgranular to aphanitic, white to yellowish gray, hard, forms bench, poorly exposed, from 143 to 144 feet, honeycombed. Chert opaque, light gray to white, at 149 feet, elongate bulbous nodules, top of interval an almost continuous layer.	9	30	142–151
5. Caliche.	5	35	137–142
6. Dolomite—microgranular, grayish yellow, argillaceous, soft, porous mostly from dissolved fossils.	2	37	135–137
7. Caliche—white, probably weathered soft limestone.	5	42	130–135
Comanche Peak Limestone: about 28 feet thick			
8. Limestone—in lower part very poorly exposed, nodular; in upper part evenly bedded, very fossiliferous. Fossils, poorly preserved casts of gastropods and pelecypods.	6	48	124–130
9. Limestone—very fine grains in aphanitic matrix, white, very fossiliferous. Fossils, abundant casts of pelecypods and gastropods, many of which have dissolved leaving the rock honeycombed.	1	49	123–124
10. Caliche—white, probably weathered soft limestone.	5	54	118–123
11. Limestone—microgranular, yellowish gray, argillaceous, silty, nodular, mostly burrowed, mostly poorly exposed. Fossils, from 110 to 115 feet, biostrome of caprinids; from 102 to 110 feet, pelecypod casts numerous, a few *Exogyra*.	16	70	102–118
Walnut Clay: 12 feet thick			
12. Calcareous clay—very sandy in upper half, sand very fine, yellowish gray, some pale yellowish-orange mottles, very fossiliferous, lower contact poorly exposed. Fossils in lower 6 feet a coquinite of *Exogyra* and other fossils, including pelecypod and gastropod casts and echinoids.	12	82	90–102
Shingle Hills Formation: 90 feet measured			
Glen Rose Limestone Member: 90 feet measured			
13. Covered—except for some dolomite near top of interval.	5	87	85–90
14. Dolomite—microgranular, grayish yellow, argillaceous, soft.	3	90	82–85
15. Covered.	2	92	80–82
16. Limestone—fine grained, white to yellowish gray, beds 2 to 4 inches thick, hard, forms bench.	1	93	79–80
17. Covered—except for one small exposure of silty, argillaceous dolomite.	8	101	71–79
18. Dolomite—microgranular, grayish yellow, soft, silty, argillaceous, less argillaceous beds are porous.	4	105	67–71
19. Covered.	4	109	63–67
20. Dolomite—microgranular, yellowish gray to grayish yellow, argillaceous, silty, soft, forms very slight bench.	4	113	59–63
21. Covered.	3	116	56–59
22. Limestone—microgranular, light yellowish gray, one bed, forms slight bench, foraminifera and other small objects abundant.	1	117	55–56
23. Covered.	4	121	51–55
24. Limestone—microgranular to aphanitic, yellowish gray, hard, in part composed of angular fragments resembling intraformational breccia, one bed, upper surface rusty, bored by *Lithodomus*?, forms bench.	1	122	50–51
25. Covered.	2	124	48–50
26. Dolomite—microgranular, grayish yellow, argillaceous, porous, soft, poorly exposed.	1	125	47–48
27. Covered.	4	129	43–47
28. Limestone—coarse-grained shell fragment coquinite in very fine-grained matrix, yellowish gray, hard, forms bench.	1	130	42–43
29. Covered.	12	142	30–42
30. Dolomite—microgranular, grayish yellow, argillaceous, soft, porous, in part burrowed, poorly exposed.	5	147	25–30
31. Covered.	2	149	23–25
32. Limestone—microgranular, white with yellowish-orange specks and horizontal streaks, shell fragments common, hard, two beds, forms bench.	1	150	22–23
33. Covered.	11	161	11–22
34. Limestone—in lower part fine grained, yellow, composed of very small objects probably ooids; in upper part microgranular to aphanitic, hard, thin bedded, forms a distinct bench.	2	163	9–11
35. Covered—to drain near point where pipeline crosses road.	9	172	0–9

The amount of insoluble residue remaining after hydrochloric acid treatment is as follows:

Feet above base	*Percent residue*	*Feet above base*	*Percent residue*
9–11	3.9	79–80	5.3
22–23	2.7	90–96	5.1
25–30	12.4	96–102	27.3
42–43	4.3	102–106	2.1
47–48	10.4	106–110	5.5
50–51	2.0	110–115	14.0
55–57	2.6	115–118	2.4
59–63)	7.0	123–130	3.2
67–71)		135–137	16.4
73–76	23.1	142–151	2.7