THE UNIVERSITY OF TEXAS
BUREAU OF ECONOMIC GEOLOGY

TO ACCOMPANY MAP—GEOLOGIC
QUADRANGLE MAP NO. 31

GEOLOGY OF THE STONEWALL QUADRANGLE, GILLESPIE AND KENDALL COUNTIES, TEXAS

VIRGIL E. BARNES

CONTENTS

GENERAL SETTING

Stonewall quadrangle includes part of the southern margin of the Llano region and part of the eastern margin of the Edwards Plateau where most of the plateau surface has been destroyed by erosion. An east-northeastward-trending lobe of the Edwards Plateau crosses the quadrangle near its southeastern corner. The area to the north is in the broad gently rolling Pedernales River basin, and that to the southeast is in a more rugged marginal part of the Blanco River drainage area.

The geology of the Stonewall quadrangle is shown on a U.S. Geological Survey 7½-minute topographic quadrangle map (contour interval 20 feet, scale 1:24,000) which covers the same area as the Stonewall quadrangle planimetric map, scale 1:31,680 (Barnes, 1952i). The relief in the quadrangle is about 600 feet; elevations range from about 1,395 feet where Pedernales River leaves the quadrangle to about 1,995 feet at the highest point on the Edwards Plateau.

The quadrangle is mostly drained by Pedernales River and its tributaries— Blumenthal, Cave, Roundhead, Threemile, and South Grape Creeks, Beckman, Gellerman, Salt, and Arnelger Branches, and other unnamed drainages. In the southeasternmost part the drainage is southward to Blanco River.

Stonewall quadrangle is high on the southern side of the Llano uplift. Cambrian and Ordovician rocks occur in patchy outcrops in the vicinity of Pedernales River and northward. Cretaceous rocks and some Quaternary surficial deposits occupy the remainder. The one fault within the quadrangle is related to the subsurface Ouachita structural belt (Flawn et al., 1961, pp. 65–81) and trends northeast-southwest. The Paleozoic rocks mostly dip gently southward to southwestward at angles up to about 8 degrees, and the relatively flat-lying Cretaceous rocks dip eastward about 10 feet per mile.

This publication on the Stonewall quadrangle is the fourth of a series of Central Texas geologic quadrangle maps which are being compiled as topographic bases become available. An index map for geologic maps already published on planimetric and topographic bases and others planned for publication on the new topographic bases is shown with the geologic map. During the period 1939–1947, the writer, assisted by Louis Dixon, mapped geologically and made a gravity survey of the Stonewall quadrangle.

GEOLOGIC FORMATIONS

PALEOZOIC ROCKS

CAMBRIAN SYSTEM (UPPER CAMBRIAN)

Riley Formation

Cap Mountain Limestone Member.—Cap Mountain Limestone crops out in the northwestern part of the quadrangle as a continuation of a fault block mapped in the Gold (Cave Creek School) quadrangle. The Cap Mountain Limestone in the Gold quadrangle contains much coarse detrital quartz and microcline and an occasional granite pebble, which indicates the presence of a buried granite hill nearby. Southwestward in the Stonewall quadrangle detrital material is less abundant, probably due to southwestward dip which exposes stratigraphically higher Cap Mountain Limestone beds. Possibly the change in grain size is due to distance from the source.

Lion Mountain Sandstone Member.—Poorly exposed Lion Mountain Sandstone crops out in the northwestern part of the quadrangle and is mostly identified by the presence in the soil of an occasional hematitic nodule and an occasional piece of cross-bedded trilobite coquinite. In the lower part of the outcrop belt a few limestone beds contain phosphatic brachiopods.

Wilberns Formation

Welge Sandstone Member.—The Welge Sandstone crops out in the northwestern part of the Stonewall quadrangle adjacent to the Lion Mountain Sandstone. The Welge is brown, nonglauconitic, and many of the quartz grains are secondarily enlarged. The secondary crystal faces glitter in sunlight.

Morgan Creek Limestone Member.—The Morgan Creek Limestone crops out in the northwestern part of the Stonewall quadrangle in an area almost half a square mile in size. It also forms a small outcrop surrounded by Hensell Sand about 1 mile northeast of Stonewall and another in Pedernales River bottom about 1 mile downstream from Stonewall.

The outcrop in the northwestern part of the quadrangle includes beds below *Eoorthis* and an unknown thickness of *Billingsella*-bearing beds above *Eoorthis*. The lower part of the Morgan Creek, as in most other parts of the Llano region, is reddish to pinkish, thickly bedded and very sandy at its base with the sand becoming less abundant upward. Above this zone the limestone is thinner bedded, medium to light gray, and, where glauconitic, greenish gray. Trilobites are abundant throughout the sequence and *Billingsella* are numerous in many beds above the *Eoorthis* bed; those in the uppermost part of the sequence are silicified. Fossils collected are brachiopods from localities 5–20A and 5–20B.

The Morgan Creek Limestone outcrop along Pedernales River is massive and lithologically similar to some portions of the Cap Mountain Limestone and might have been mistaken for Cap Mountain except for the identification by Dr. Josiah Bridge of a conaspid zone fauna from it (locality 2–20A).

Uppermost Morgan Creek Limestone beds are exposed in the small outcrop 1 mile northeast of Stonewall.

Point Peak Member.—Isolated outcrops of Point Peak are common northeast of Stonewall, along Cave Creek, and in the vicinity of Blumenthal. The outcrops along the Pedernales near Blumenthal are stromatolitic limestone overlain by dolomite of the San Saba Member. Two samples from these outcrops were described by Barnes, Dawson, and Parkinson (1947, pp. 134–135).

One sample from a bed 20 inches thick is a rather pleasing combination in color of greenish gray with stylolites of dull purple and faint purplish-tinted patches. Fossil fragments are abundant and small cavities are numerous. The rock takes a rather good but uneven polish. In thin section the rock is seen to be about equally dolomite and calcite containing a small amount of angular quartz up to 0.1 mm in size. The dolomite rhombs are about 0.3 mm in size and the calcite grains range from microgranular or smaller up to 3 mm.

The other sample is from a 2-foot bed several feet higher stratigraphically and is predominantly brownish red with randomly distributed white and ivory-colored areas, none of which are more than a quarter inch in size. The rock takes a brilliant polish and as seen in thin section is about two-thirds dolomite in 0.3-mm rhombs and one-third calcite in grains from 1 to 3 mm in size. A small amount of silt-size angular quartz is present.

Northwest of Stonewall the lower part of the Point Peak is mostly siltstone; a limestone bed near the middle contains silicified *Billingsella.* The upper portion is composed of stromatolitic limestone masses interspersed with bedded limestone and dolomite and intergrades upward and laterally with the dolomite of the overlying San Saba Member. The boundary between the two members, therefore, is not at a constant stratigraphic level.

The Point Peak within the quadrangle, except for the *Billingsella*-bearing bed in the lower part, appears unfossiliferous.

San Saba Member.—After publication of various Gillespie County quadrangles by Barnes (1952a-g), 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 various 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 Stonewall quadrangle exposed San Saba rocks are mostly dolomite and crop out in numerous small areas in the northern part of the quadrangle. East of Stonewall where fine-grained dolomite rests on the Point Peak Member, fine-grained and coarse-grained facies have been mapped. In the vicinity of Blumenthal, coarse-grained dolomite rests on the Point Peak Member, and in this area coarse-grained and fine-grained facies have not been separately mapped.

Aphanitic, calcitic San Saba, entirely similar to limestone in the overlying Ellenburger, is present east of Stonewall where in places it intergrades laterally with coarse-grained dolomite. Along Roundhead Creek fine-grained dolomite of the upper part of the San Saba Member is in collapse contact with both limestone and coarse-grained dolomite.

Barnes, Dawson, and Parkinson (1947, p. 153) described a sample of brecciated dolomite composed of brownish fragments in a deep reddish-brown, fritted groundmass. The dolomite is porous and takes a rather poor polish. In thin section, dolomite rhombs are seen to be about 2 mm in size and silt-size angular quartz grains are common.

The limestone is unfossiliferous and fossils are in chert in the dolomite. Trilobites and brachiopods preserved in chert were collected from localities 2–8A and 6–13A.

ORDOVICIAN SYSTEM (LOWER ORDOVICIAN)

Ellenburger Group

Tanyard Formation

Staendebach Member.—Threadgill rocks are absent and the Tanyard Formation in the Stonewall quadrangle is represented by fine-grained Staendebach dolomite which coarsens somewhat toward the overlying Gorman contact. Only the uppermost part of the member appears to be present and most of the outcrops are in the northwestern part of the quadrangle. Three outcrops are along U.S. Highway 290 west of Threemile Creek, and one small outcrop is north of Pedernales River about 1 mile west of Stonewall.

Fossils collected just west of Stonewall Cemetery were identified by Dr. Josiah Bridge, of the U. S. Geological Survey, as belonging to the *Symphysurina* zone. Fossils noted, but not collected, in the next two outcrops to the southwest are *Lytospira* and *Ophileta.*

Gorman Formation

Dolomitic facies.—Gorman microgranular dolomite occupies the center of a gentle northeast-southwest-trending synclinal basin in the northeastern part of the quadrangle. On the Gold quadrangle (Barnes, 1952f) to the north sand grains are common in some beds. No fossils were found.

MESOZOIC ROCKS

CRETACEOUS SYSTEM (LOWER CRETACEOUS)

Trinity Group

Shingle Hills Formation

Hensell Sand Member.—The Hensell Sand Member (Barnes, 1948) in the area of Paleozoic outcrop rests on an irregular erosional surface carved on Paleozoic rocks ranging in age from Cambrian Cap Mountain Limestone to Ordovician Gorman rocks. It is likely that other units of the Ordovician are overlapped in the subsurface. This surface, in general, slopes southward and its relief in the area of Paleozoic outcrop is about 200 feet, ranging in elevation from 1,380 to 1,580 feet.

The maximum thickness of the Hensell Sand is estimated to be between 100 and 130 feet in the area between Pedernales River and the base of the Glen Rose Limestone to the south. Additional beds are probably present at its base southward in the subsurface.

Indurated conglomerate at the base of the Hensell was mapped along Pedernales River and South Grape Creek. Uncemented gravel was not mapped separately. The pebbles in one of these uncemented conglomerates, in a highway cut about one-quarter mile east of South Grape Creek, is composed mostly of Cambrian limestone, Ordovician(?) chert, and granite. The conglomerate underlies a coarse-grained gray sandstone. In general, the Hensell becomes finer grained upward, ranging from conglomerate in places at the base to abundant silt and clay with some calcareous material in the upper part; however, tongues of coarser grained material commonly occur at various levels depending to some extent on the nearness laterally of pre-Cretaceous rocks. The kind of pre-Cretaceous rock from which the Hensell is derived influences its composition and character. Angular quartz and solution-sculptured microcline granules are common in the lower part of the Hensell especially in the vicinity of Pedernales River.

In the Stonewall quadrangle the lower part of the Hensell Sand is yellowish gray to greenish gray instead of various shades of red as is common elsewhere in Gillespie County. The upper part of the Hensell is various shades of gray and a middle reddish facies wedges out eastward.

The Hensell is slightly indurated and forms gentle slopes. It is largely cultivated. The more siliceous and coarser grained lower portions, where still wooded, support a growth of broad-leaf oak which on aerial photographs shows as a featureless expanse of woodland.

Measurable sections of Hensell Sand are usually only a fraction of the thickness of the member. One 40-foot thick section along Threemile Creek is fairly well exposed; another excellently exposed section along South Grape Creek, 68 feet thick, is described on page 9.

Fossils are scarce in the Hensell; however, some were present in both sections. Dr. Ralph Imlay, of the U. S. Geological Survey, identified fossils in two collections as follows:

Locality 3–15A, about 1 mile south-southeast of Stonewall—

Ostrea sp.
Nerinea sp.

Locality 6–1A, along Threemile Creek about 1.8 miles southwest of Stonewall—

Panope? cf. *knowltoni* (Hill)
Cucullaea sp.
Pecten (Chlamys) stantoni Hill
Cassiope branneri (Hill)

Glen Rose Limestone Member.—The Glen Rose Limestone forms a broad east-west outcrop belt occupying about half of the middle and southern thirds of the quadrangle. Glen Rose Limestone also crops out in lateral drainages of Blanco River in the southeastern part of the quadrangle.

The Glen Rose outcrop thickness is about 270 feet along the road from Fredericksburg to Blanco. Additional beds are probably present at its base in the subsurface in the southern part of the quadrangle because of gradation southward of Hensell lithology to Glen Rose lithology. The Glen Rose 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 "stair-step" 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 contract rises to the base of the next scarp-forming bed. Much of this contact was traced between observed points with the aid of a stereoscope.

Gulfward from the Stonewall 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*. The *Corbula* bed has been mapped to near the western border of the Hye quadrangle (Barnes, 1965a) where it appears to terminate against a channel filled by coarse-grained Hensell Sand. In the Stonewall quadrangle only that part of the Glen Rose above the *Corbula* bed is present.

Along South Grape Creek 77 feet of Glen Rose beds were measured and described (pp. ....). These beds are similar to those in the rest of the Glen Rose sequence except that they are somewhat more fossiliferous.

The Glen Rose is mostly suited to ranching, although flatter areas underlain by marl, clay, and sand 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.

Fossils from two localities in the Glen Rose have been identified by Dr. Ralph Imlay, U.S. Geological Survey, as follows:

Locality 6–15A, about 1.7 miles airline southeast of Luckenbach—

Homomya juraf acies Cragin	*Trigonia* sp.
Panope? *knowltoni* (Hill)	*Protocardia* sp.
Tapes sp.	*Cyprimeria* sp.
Serpula paluxiensis Hill	*Pecten (Chlamys) stantoni* Hill
Enallaster cf. *texanus* (Roemer)	*Cardium*? sp.
Porocystis globularis (Giebel)	*Gryphaea wardi* Hill and Vaughan
Gryphaea mucronata Gabb	*Lunatia*? *praegrandis* (Roemer)
Cuspidaria sp.	*Lunatia*? sp.
Astarte sp.	*Pseudonerinea*? sp.
Anomia sp.	*Tylostoma* cf. *regina* (Cragin)
Aporrhais? sp.	*Trapezium*? sp.
Cucullaea sp.	*Panope* sp.
Arctica medialis (Conrad)	

Locality 6–17A, about 3 miles airline south-southeast of Luckenbach and from near the top of the Glen Rose Limestone—

Anatina sp.
Nerinea sp.

Fredericksburg Group

Included within the Fredericksburg Group in the Stonewall quadrangle is about 170 feet of Edwards Limestone, about 28 feet of Comanche Peak Limestone, and about 15 feet of Walnut Clay. The boundaries between the units are gradational.

Walnut Clay

Walnut Clay flanks the Edwards Plateau lobe in the southern part of the quadrangle; it also crops out on several plateau outliers and a few outliers that have lost their plateau surface through erosion. A thickness of 15 feet was measured along the Fredericksburg-Blanco road and this appears to be about the maximum thickness present in Stonewall quadrangle. The Walnut rests on a poorly exposed limestone bed at the top of the Glen Rose. The bed has a rust-colored surface and similar limestone is at the top of the Glen Rose in quadrangles to the west and north. Near the measured section, a block of bored limestone was found which may be from this bed. Eastward in Blanco County the top limestone bed of the Glen Rose is commonly bored.

The Walnut Clay forms a bench which throughout the eastern part of the quadrangle is wide enough to map as a band. In the western part of the quadrangle it is shown as a solid color line. The Walnut bench is typically barren of trees.

The Walnut grades upward from calcareous clay to argillaceous limestone of the overlying Comanche Peak. The contact can be rather closely placed in stream banks and road cuts where the softer clay is removed, leaving the Comanche Peak as overhangs. Elsewhere, the contact is drawn at a break in slope.

Most fossil collections from the Walnut also include fossils that have drifted down slope from the Comanche Peak. Fossils in seven collections have been identified by Dr. Ralph Imlay, U.S. Geological Survey, as follows:

Locality 3–12A, about 6.4 miles airline south-southeast of Stonewall—

Lunatia? praegrandis (Roemer)
Lunatia? sp.
Tylostoma sp.
Tylostoma cf. *regina* (Cragin)
Aporrhais? cf. *subfusiformis* (Shumard)
Nerinea cf. *incisa* Giebel
Turritella sp.
Lunatia? pedernalis (Roemer)
Trapezium texana (Roemer)
Linearia? irradians (Roemer)
Tapes cf. *guadalupae* Böse
Tapes cf. *aldamense* (Böse)
Protocardia sp.
Tapes cf. *whitei* Böse
Pholadomya sancti-sabae (Roemer)
Cyprimeria texana (Roemer)
Mactra? sp.
Trigonia sp.
Cucullaea sp.
Arctica sp.
Pecten (Neithea) occidentalis (Conrad)
Isocardia sp.
Metengonoceras sp.
Metengonoceras cf. *ambiguum* Hyatt
Exogyra texana Roemer
Exogyra texana var. *weatherfordensis* Cragin
Gryphaea mucronata Gabb
Enallaster texanus (Roemer)
Holectypus planatus Roemer

Locality 3–17A, about 4.3 miles airline south by a little east of Stonewall—

Cardium sp.
Pholadomya sancti-sabae (Roemer)
Brachydontes pedernalis (Roemer)
Holectypus cf. *planatus* Roemer

Locality 6–4A, about 5 miles airline south by a little west of Stonewall—

Trigonia sp.
Exogyra texana Roemer
Gryphaea mucronata Gabb
Enallaster texanus (Roemer)

Locality 6–5A, about 4.3 miles airline southeast of Luckenbach—

Gryphaea mucronata Gabb
Ostrea (Lopha) sp.
Holectypus planatus Roemer

Locality 6–5B, about 4.5 miles airline southeast of Luckenbach—

Caprinula crassifibra (Roemer)
Enallaster cf. *obliquatus* Clark

Locality 6–5C, about 4.5 miles airline southeast of Luckenbach—

Tylostoma cf. *regina* (Cragin)
Aporrhais? subfusiformis (Shumard)
Nerinea cf. *incisa* Giebel
Aporrhais? sp.
Protocardia multistriata Shumard
Tapes cf. *whitei* Böse
Tapes cf. *guadalupae* Böse
Tapes cf. *aldamense* Böse
Pholadomya sancti-sabae (Roemer)
Cyprimeria texana (Roemer)
Trigonia sp.
Isocardia sp.
Modiola concentrice-costellata Roemer
Brachydontes pedernalis (Roemer)
Exogyra texana Roemer
Gryphaea mucronata Gabb
Enallaster texanus (Roemer)
Trochotiara texana (Roemer)
Holectypus planatus Roemer
Holectypus engerrandi Lambert

Locality 6–10A, about 3.5 miles southeast of Luckenbach—

Caprinula crassifibra (Roemer)

Comanche Peak Limestone

Comanche Peak Limestone flanks the Edwards Plateau in the southern part of the quadrangle; it also crops out on numerous outliers. The thickness of the Comanche Peak has not been measured within the quadrangle. A short distance south of the quadrangle along the Fredericksburg-Blanco road, a combined thickness of 43 feet of Comanche Peak and Walnut was measured. If 15 feet is allowed for the thickness of the Walnut, 28 feet is left for the thickness of the Comanche Peak. This is near the thickness of 29 feet found for the Comanche Peak in the Cain City quadrangle (Barnes, 1952h). Described sections of the Comanche Peak are in descriptions of the Palo Alto quadrangle (Barnes, 1952e) and the Hye quadrangle (Barnes, 1965a).

The Comanche Peak is a soft argillaceous limestone in which the clay content decreases upward. The lower three-fourths, massive in its upper part and nodular at its base, is extensively burrowed. The upper quarter is well bedded and seldom exposed. The upper boundary of the Comanche Peak is placed at the base of the first chert-bearing limestone. Because the soft Comanche Peak Limestone is more easily eroded than the overlying hard Edwards Limestone, the Comanche Peak is characterized throughout the quadrangle by a steep slope.

On aerial photographs the Comanche Peak Limestone on north slopes is characterized by a distinctive dark band, caused by a thick growth of vegetation dominated by a narrow-leaf oak identified by Cuyler (1931) as "*Quercus texana* Sargent (Texas oak)."

The lower part of the Comanche Peak is fairly fossiliferous; however, no collections were made of Comanche Peak fossils except those that might have mingled with fossils in collections from the Walnut Clay.

Edwards Limestone

The Edwards Limestone forms the surface of the Edwards Plateau in the southern part of the quadrangle; it also crops out on numerous plateau outliers. The Edwards Limestone is probably about 170 feet thick at the high point of the plateau surface north of the Fredericksburg-Blanco road. The base of the formation is placed at the base of the lowest chert-bearing limestone bed.

In the Stonewall quadrangle the Edwards is composed of limestone, dolomite, and chert. Gypsum may also be present about 140 feet above the base of the Edwards, as this is the level of the Kirshberg Evaporite in the northern part of Gillespie County (Barnes, 1944, 1952a, 1952b). 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 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 have developed a soil adequate 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. As some of the chert in the Edwards Limestone was used for the manufacture of flint implements, the chert in the Edwards is usually referred to as flint. Because of gentle slopes and lack of exposures of the softer beds, it is impossible to describe a complete section of Edwards within the quadrangle. No fossils were collected; however, some fossiliferous chert was seen near the divide on the Fredericksburg-Blanco road.

CENOZOIC ROCKS

QUATERNARY SYSTEM

Pleistocene Series

High gravel.—High gravel deposits were probably mostly stream deposited; however, some are 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 South Grape and Threemile 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 exposed along and north of Pedernales River continue into the subsurface beneath Cretaceous rocks. It is likely that all units of the Cambrian, except perhaps the Hickory Sandstone, and all units of the Ordovician are present in the subsurface directly beneath the Cretaceous. Within Stonewall quadrangle, well data are insufficient to determine the thickness of the various Paleozoic units; however, thicknesses of these units can be estimated closely from measurements in nearby areas made by Bridge, Barnes, and Cloud (1947), Cloud and Barnes (1948), and Barnes (1956c, 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	400
Point Peak Member	65
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

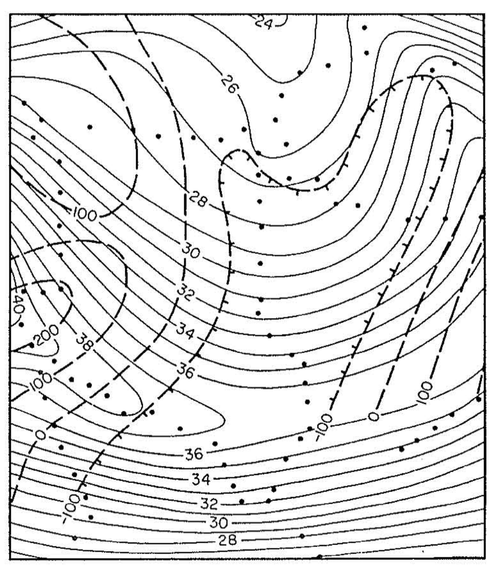

Fig. 1. Gravity and magnetic data, Stonewall quadrangle, Texas. Solid lines—gravitational force in milligals (relative); dashed lines—magnetic force in gammas (relative); dots—points of gravity observation.

Exposed Paleozoic rocks to the northeast in the North Grape Creek quadrangle (Barnes, 1952g; reissued as Rocky Creek quadrangle, Barnes, 1965b) are faulted; their pattern beneath the Cretaceous in the Stonewall quadrangle is probably equally complex.

Sources of information about the Precambrian rocks upon which the Paleozoic rocks lie are limited to gravity and magnetic data (fig. 1). An east-west gravity ridge through the southern part of the quadrangle reaches a maximum in the Cain City quadrangle to the west and dominates the gravity picture within the quadrangle. The value of gravity for the Cain City quadrangle maximum is the highest value found in either Gillespie or Blanco counties. Large gravity maxima in the area of outcropping Precambrian rocks of the Llano region are associated with Packsaddle Schist and basic igneous masses, and large gravity minima are associated with Town Mountain Granite masses (Romberg and Barnes, 1944; Barnes, Romberg, and Anderson, 1954a, 1954b, 1955). North and south of the maximum, the value of gravity decreases, indicating the presence of less dense rock in these directions.

A north-south magnetic minimum crossing the gravity maximum in Stonewall quadrangle 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, and in such case the portion of the gravity maximum in the Stonewall quadrangle probably represents Packsaddle Schist.

MINERAL RESOURCES

The mineral resources of the quadrangle are limited to construction materials and water. The soils developed on the Hensell, alluvium, and portions of the Glen Rose are suited to agriculture. The rest 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 mostly unsuited to the establishment of quarries. Barnes, Dawson, and Parkinson (1947, pp. 134–135, 153–154) collected three samples of limestone and dolomite along Pedernales River near Blumenthal. One was from massive stromatolitic limestone in the Point Peak, one was from a dolomitic inter-bed between stromatolitic masses, and the third was coarse-grained dolomite from the overlying San Saba Member. The stromatolitic limestone took a brilliant polish; the polish on the other two samples was only fair. The stromatolitic limestone is attractive, of good quality, and probably of value as a dimension or ornamental stone. The deposit sampled in the river bed is not favorably situated for quarrying; however, a small deposit well above river level is located 0.5 mile to the northeast.

Small deposits of attractive light-colored aphanitic limestone in the northeastern part of the quadrangle intergrade with coarse-grained dolomite. These deposits may not be of value because of their size and probable lack of uniformity.

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; however, building stone quality rock may be present. About 170 feet of Edwards Limestone crops out within the quadrangle, and even though no beds suitable for dimension stone were seen, some may be present.

Crushed stone.—Rock in all Paleozoic formations, except the Welge and Lion Mountain Sandstones and the siltstone of the Point Peak, is suitable for crushed rock including surfacing granules. 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.—Secondary roads within the quadrangle mostly have been surfaced by calcareous materials from the Glen Rose, caliche from colluvial deposits, and siltstone from the Point Peak; in one road material pit porous chert from the Staendebach was quarried. Such material also has been used for base-course material in highway construction.

WATER

A ground-water survey of Gillespie County by Shield (1937) inventoried 10 wells in the Stonewall quadrangle. Of 8 wells probably in the area of Hensell outcrop, some bottomed in Hensell and others bottomed in Paleozoic rocks. One of the latter in the vicinity of Blumenthal was reported to be obtaining water from limestone, and from its depth it is estimated that the well bottomed in the Welge and Lion Mountain Sandstone interval. Two wells in the Glen Rose outcrop area probably bottomed in Hensell Sand.

The wells range from 38 to 325 feet in depth, and in 1936 the water level ranged from 25 to 178 feet below the surface. The total solids ranged between 366 and 2,343 parts per million with half the wells above a thousand parts per million. The main easily available source of ground water south of Pedernales River is the Hensell Sand.

The Hickory Sandstone is water-bearing in some parts of Central Texas. In the area of the Cap Mountain Limestone outcrop in the northwestern part of the quadrangle the top of the Hickory in places may be as shallow as 400 feet. If water is present in the Hickory, the lower part is usually the water-bearing portion. The shallowest water-bearing Hickory is probably at a depth of 600 or 700 feet. The fault pattern beneath the Cretaceous within the Stonewall quadrangle is unknown, but from the outcrop pattern it is unlikely that Hickory Sandstone will lie directly beneath Cretaceous rocks. Where Paleozoic rocks crop out, the depth to the Hickory Sandstone can be estimated by using the table on page 6.

The Welge and Lion Mountain Sandstones are about 500 feet nearer to the surface than the Hickory Sandstone; 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.

REFERENCES

BARNES, V. E. (1944) Gypsum in the Edwards Limestone of Central Texas, *in* Texas mineral resources: Univ. Texas Pub. 4301 (Jan. 1, 1943), pp. 35–46.

———— (1948) Ouachita facies in Central Texas: Univ. Texas, Bur. Econ. Geology Rept. Inv. No. 2, 12 pp.

———— (1952a) Geology of the Squaw Creek quadrangle, Gillespie and Mason counties, Texas: Univ. Texas, Bur. Econ. Geology Geol. Quad. Map No. 1.

———— (1952b) Geology of the Hilltop quadrangle, Gillespie, Llano, and Mason counties, Texas: Univ. Texas, Bur. Econ. Geology Geol. Quad. Map No. 2.

———— (1952c) Geology of the Willow City quadrangle, Gillespie and Llano counties, Texas: Univ. Texas, Bur. Econ. Geology Geol. Quad. Map No. 4.

———— (1952d) Geology of the Blowout quadrangle, Gillespie and Llano counties, Texas: Univ. Texas, Bur. Econ. Geology Geol. Quad. Map No. 5.

———— (1952e) Geology of the Palo Alto Creek quadrangle, Gillespie County, Texas: Univ. Texas, Bur. Econ. Geology Geol. Quad. Map No. 8.

———— (1952f) Geology of the Gold quadrangle, Gillespie County, Texas: Univ. Texas, Bur. Econ. Geology Geol. Quad. Map No. 9.

———— (1952g) Geology of the North Grape Creek quadrangle, Blanco and Gillespie counties, Texas: Univ. Texas, Bur. Econ. Geology Geol. Quad. Map No. 10.

———— (1952h) Geology of the Cain City quadrangle, Gillespie and Kendall counties, Texas: Univ. Texas, Bur. Econ. Geology Geol. Quad. Map No. 13.

———— (1952i) Geology of the Stonewall quadrangle, Gillespie and Kendall counties, Texas: Univ. Texas, Bur. Econ. Geology Geol. Quad. Map No. 14.

———— (1956a) Geology of the Fall Prong quadrangle, Kimble, Gillespie, and Mason counties, Texas: Univ. Texas, Bur. Econ. Geology Geol. Quad. Map No. 19.

———— (1956b) Geology of the Threadgill Creek quadrangle, Gillespie and Mason counties, Texas: Univ. Texas, Bur. Econ. Geology Geol. Quad. Map No. 20.

———— (1956c) Lead deposits in the Upper Cambrian of Central Texas: Univ. Texas, Bur. Econ. Geology Rept. Inv. No. 26, 68 pp.

———— (1959) General discussion, *in* Stratigraphy of the pre-Simpson Paleozoic subsurface rocks of Texas and southeast New Mexico: Univ. Texas Pub. 5924, pp. 11–72, pls. 1–6.

———— (1965a) Geology of the Hye quadrangle, Blanco, Gillespie, and Kendall counties, Texas: Univ. Texas, Bur. Econ. Geology Geol. Quad. Map No. 25.

———— (1965b) Geology of the Rocky Creek quadrangle, Gillespie and Blanco counties, Texas: Univ. Texas, Bur. Econ. Geology Geol. Quad. Map No. 29. (Revision of North Grape Creek quadrangle map (Barnes, 1952g).)

———— and BELL, W. C. (1954) Cambrian rocks of Central Texas: Guidebook, San Angelo Geol. Soc. Field Conference, March 19–20, 1954, pp. 35–69.

————, DAWSON, R. F., and PARKINSON, G. A. (1947) Building stones of Central Texas: Univ. Texas Pub. 4246 (Dec. 8, 1942), 198 pp.

————, ROMBERG, F. E., and ANDERSON, W. A. (1954a) Correlation of gravity and magnetic observations with geology of Blanco and Gillespie counties, Texas: 19th Internat. Geol. Congress, Algiers, Proc., Sec. 9, pp. 151–162.

————, ————, and ———— (1954b) Geology and geophysics of Blanco and Gillespie counties, Texas: Guidebook, San Angelo Geol. Soc. Field Conference, March 19–20, 1954, pp. 78–90.

————, ————, and ———— (1955) Map showing correlation of geologic, gravity, and magnetic observations, Blanco and Gillespie counties, Texas: Univ. Texas, Bur. Econ. Geology.

BELL, W. C., and BARNES, V. E. (1961) Cambrian of Central Texas, *in* Cambrian Symposium, vol. 3, pp. 484–503, 20th Internat. Geol. Congress, Mexico, 1956 (published in Moscow).

BRIDGE, JOSIAH, BARNES, V. E., and CLOUD, P. E., JR. (1947) Stratigraphy of the Upper Cambrian, Llano uplift, Texas: Bull. Geol. Soc. Amer., vol. 58, pp. 109–124.

CLOUD, P. E., JR., and BARNES, V. E. (1948) The Ellenburger Group of Central Texas: Univ. Texas Pub. 4621 (June 1, 1946), 473 pp.

CUYLER, R. H. (1931) Vegetation as an indicator of geologic formations: Bull. Amer. Assoc. Petrol. Geol., vol. 15, pp. 67–78.

FLAWN, P. T., GOLDSTEIN, AUGUST, JR., KING, P. B., and WEAVER, C. E. (1961) The Ouachita System: Univ. Texas Pub. 6120, 401 pp.

GEORGE, W. O. (1947) Geology and ground-water resources of Comal County, Texas: Texas State Board of Water Engineers, 142 pp.

ROMBERG, F. E., and BARNES, V. E. (1944) Correlation of gravity observations with the geology of the Smoothingiron granite mass, Llano County, Texas: Geophysics, vol. 9, pp. 79–93; Geophys. Case Histories, vol. 1, 1948, pp. 415–428.

SHIELD, ELGEAN (1937) Records of wells, drillers' logs and water analyses in Gillespie County, Texas: Texas State Board of Water Engineers, 51 pp.

WHITNEY, M. I. (1952) Some zone marker fossils of the Glen Rose Formation of Central Texas: Jour. Paleont., vol. 26, pp. 65–73.

STRATIGRAPHIC SECTION

Section along South Grape Creek, 2.25 miles south-southwest of Blumenthal.

		Thickness in Feet		*Feet*
		Interval	*Cumulative*	*above base*
	Shingle Hills Formation: 145 feet measured			
	Glen Rose Limestone Member: 77 feet measured			
1.	Limestone—coarse grained, grayish orange, composed of ground-up oyster shell, one bed, very hard, forms top of hill heavily overgrown by vegetation.	1	1	144 –145
2.	Clay—poorly exposed.	17	18	127 –144
3.	Limestone—coarse grained, yellowish gray composed of fossil fragments, slightly sandy, hard, forms a very wide bench.	0.5	18.5	126.5–127
4.	Clay—poorly exposed.	0.5	19	126 –126.5
5.	Limestone—silty, argillaceous, nodular, burrowed, forms narrow bench.	2	21	124 –126
6.	Clay—poorly exposed.	2	23	122 –124
7.	Limestone—silty, argillaceous, nodular, burrowed, upper surface bored, forms narrow bench.	2	25	120 –122
8.	Clay—poorly exposed.	4	29	116 –120
9.	Limestone—silty, argillaceous, nodular, honeycombed from weathering of burrows, forms narrow bench.	1	30	115 –116
10.	Clay and limestone—clay poorly exposed. Two-inch limestone bed at about 109 feet, fossiliferous. Fossils are mostly gastropods weathering in relief on top surface, up to 2.5 inches long, 0.1 inch in diameter. Pelecypods and gastropods resting on bench, probably weathered from interval.	11	41	104 –115
11.	Limestone—silty, argillaceous nodular, contains a few fossil casts, forms bench.	4	45	100 –104
12.	Clay—poorly exposed.	2	47	98 –100
13.	Limestone—argillaceous, silty, nodular, fossiliferous, forms bench. Fossils are pelecypod and gastropod casts and *Porocystis* throughout most of interval; several genera of small pelecypods weather in relief on an inch-thick platy limestone bed forming base of interval.	3	50	95 – 98
14.	Clay—poorly exposed.	2	52	93 – 95
15.	Limestone—argillaceous, nodular, fossil casts common, forms bench.	3	55	90 – 93
16.	Clay—very calcareous, silty, fossiliferous. Fossils are pelecypod and gastropod casts, worm tubes, *Porocystis*, and a few oysters.	5	60	85 – 90
17.	Limestone—silty, argillaceous, nodular; in lower part sandy, numerous yellowish-gray burrows in yellowish-orange matrix; in upper part a few recessive zones are somewhat more argillaceous; forms distinct bench traceable for long distance. Fossils are abundant pelecypod casts, numerous gastropod casts, and in upper part *Porocystis* up to an inch in diameter.	17	77	68 – 85
	Hensell Sand Member: 68 feet measured			
18.	Sand—coarse to fine grained, a few thin pebbly beds, sand grains angular to subrounded, a few well-rounded microcline grains present but smaller than lower in section; bottom foot calcite cemented; from 61.5 to 62 feet indurated, somewhat cross-bedded, appears to be burrowed, contains casts and molds of pelecypods and gastropods.	14	91	54 – 68
19.	Clay—very sandy, weathers yellowish gray.	1	92	53 – 54
20.	Sandstone—medium grained, argillaceous, grains angular, calcite cemented, resists weathering.	1	93	52 – 53
21.	Clay—silty, weathers yellowish orange, oysters form clumps at base of interval.	1	94	51 – 52
22.	Sand—mostly medium grained, some lenses of coarse- and fine-grained sand, very argillaceous, cross-bedded, grains angular, mostly quartz, some microcline, a few locally derived slightly finer grained argillaceous pebbles up to an inch in size.	16	110	35 – 51
23.	Sand—mostly very coarse grained, some fine- to medium-grained lenses, very argillaceous, cross-bedded, poorly sorted, a few pebbles up to an inch in size; sand grains mostly angular, mostly quartz, white specks of kaolin(?) are probably weathered plagioclase, microcline common up to one-quarter inch in size; several grayish-green lenses of clay, contorted balls of similar clay and masses of finer grained sediment are common in the very coarse-grained sand.	11	121	24 – 35
24.	Sand—mostly fine to medium grained, pale olive in part with pinkish cast, very argillaceous, sand grains angular, mostly quartz, some microcline, mica scarce, caliche forms irregular patches of stalactitic crust on vertical surface of outcrop.	9	130	15 – 24
25.	Sand—very coarse grained, in part conglomeratic, very argillaceous, cross-bedded, poorly sorted; sand grains rough, mostly angular, mostly quartz, much microcline up to three-fourths inch in size, small kaolin(?) specks may be weathered plagioclase; pebbles 1 to 2 inches in diameter, in part well-rounded quartz and quartzite, in part irregular pebbles of calcite and sand having the appearance of caliche.	12	142	3 – 15
26.	Clay—very sandy, grayish green, caliche caps interval and forms stalactites on face of outcrop.	3	145	0 – 3

The amount of insoluble residue, after hydrochloric acid treatment, for a portion of the section is as follows:

Feet above base	*Percent residue*
0– 5	44.7
5–10	78.7
10–15	86.7
15–20	73.2
20–25	94.2
25–30	95.5
30–35	90.5
35–40	94.8
40–45	92.9
45–51	99.2
51–56	58.7
56–62	95.0
62–68	90.3
68–77	19.5
77–85	6.9