GEOLOGY OF THE DRY BRANCH QUADRANGLE, KERR AND GILLESPIE COUNTIES, TEXAS

VIRGIL E. BARNES

GENERAL SETTING

Dry Branch quadrangle is in the Edwards Plateau province southwest of the Llano region. It is near the margin of the plateau, and Johnson Creek and some of its tributaries, such as Dry, Falls, Fessington, and Welch Branches, have cut into the plateau in the southern part of the quadrangle.

The geology of the Dry Branch quadrangle is shown on a planimetric map, and the only topographic map available is the reconnaissance 30-minute Kerrville quadrangle. Elevations ranging between 1,819 and 2,254 feet were determined during traversing for control, but neither the highest nor the lowest elevation was reached. However, it is estimated that the relief within the quadrangle is about 460 feet, ranging between about 1,800 and 2,260 feet.

The quadrangle is mostly within the Guadalupe River drainage basin and is drained by Johnson Creek and its tributaries, such as Fall, Dry, Fessington, Welch, and Smith Branches, Rough Hollow, and Bad Man Draw. Klein and Scott branches of Pedernales River drain the northeastern portion of the quadrangle.

Dry Branch quadrangle is on the southwestern side of the Llano uplift, and Cretaceous rocks crop out in all of the quadrangle. The depth to faulted and gently dipping Paleozoic rocks is probably only a few hundred feet beneath the more deeply incised streams. Essentially horizontal Cretaceous rocks form the outcrops in the quadrangle.

Broad discussions of the stratigraphic, structural, economic, and geophysical problems of the region are given in references cited below. This publication on the Dry Branch quadrangle is one of a series of similar publications, an index to which is shown on the opposite page. The reader is referred to the index map to locate other quadrangles mentioned in the present text.

GEOLOGIC FORMATIONS

MESOZOIC ROCKS

CRETACEOUS SYSTEM (LOWER CRETACEOUS)

Shingle Hills Formation

Hensell sand member (Barnes, 1948).—The Hensell sand does not crop out within the Dry Branch quadrangle but is present in the subsurface.

Glen Rose limestone member.—The Glen Rose limestone is about 90 feet thick at the point where Johnson Creek leaves the quadrangle. Additional beds are present in the subsurface. The Glen Rose limestone consists of alternating beds of limestone, dolomite, clay, and sand or, more correctly stated, beds having varying proportions of these materials and in addition silt. The upper contact of the Glen Rose limestone is well exposed along Johnson Creek upstream from Sunset School. In this exposure, cracks in the upper 2 feet of the Glen Rose are filled with Walnut clay.

The Glen Rose limestone, consisting of beds having varying resistance to erosion, produces a terraced topography. In the Dry Branch quadrangle the terraces are not as distinct as in quadrangles in the eastern part of Gillespie County, and little vegetational banding can be seen on aerial photographs. A section mostly of Glen Rose limestone, described below, was measured in the southern part of the quadrangle north of Johnson Creek. The bottom of the section is at creek level.

Along Henderson Branch in Kerr County the upper contact of the Glen Rose is well exposed. About 7 feet of Glen Rose beds are present. The lower 3 feet is argillaceous sand which is yellowish gray to grayish yellow, and the upper 4 feet is grayish yellow, argillaceous sand which contains numerous vertical tubes. The upper surface of the Glen Rose is wavy, and a bed of *Exogyra* (Walnut clay) about 1 foot thick rests upon it. About 2 inches above the base of the *Exogyra* bed a block of limestone was found containing *Lithodomus?* borings. Resting on the *Exogyra* bed is a foot of large-nodule limestone followed by several feet of small-nodule limestone typical of the Comanche Peak limestone.

Fredericksburg Group

Included within the Fredericksburg group of the Dry Branch quadrangle is about 360 feet of Edwards limestone, about 36 feet of Comanche Peak limestone, and about 0.5 foot of Walnut clay. The boundaries of the units are gradational, and for this quadrangle, Thompson's (1935) observation that these units should have about the rank of members seems logical. However, instead of introducing a new name, Fredericksburg could easily be dropped from group to formational rank, especially as the U. S. Geological Survey excludes the Kiamichi clay from the Fredericksburg group (Wilmarth, 1938, p. 776).

Walnut clay.—The Walnut clay consists of *Exogyra* and sufficient clay to fill the voids. It is 6 inches thick in a section upstream from Sunset School and 1 foot thick on Henderson Branch. The contact of the Walnut with the Glen Rose is well exposed in several places within the quadrangle. In the section upstream from Sunset School, Walnut clay penetrates cracks to a depth of 2 feet in the Glen Rose and the contact with the Glen Rose is wavy. The same type of wavy contact was noted on Henderson Branch, and here the Walnut rests on a bed in the Glen Rose which is full of vertical tubes.

The Walnut clay grades upward into the Comanche Peak limestone and within the Dry Branch quadrangle is little more than a layer of *Exogyra* surrounded by clay. The Walnut outcrop is represented on the map as a solid color line. It is too thin to influence noticeably either the vegetation or the culture of the area. The Walnut clay is highly calcareous, silty, yellowish gray, and highly fossiliferous. No fossil collections were made from it within the Dry Branch quadrangle.

Comanche Peak limestone.—The Comanche Peak limestone in the section upstream from Sunset School is 36.5 feet thick and is exceptionally well exposed. The Comanche Peak grades downward into the Walnut clay, which is very thin. The upper boundary is arbitrarily placed at the base of a very thin-bedded zone which is thought to correlate with a similar zone containing some chert in Gillespie County.

The Comanche Peak limestone is about 5 feet thicker than the average found for it in Gillespie County—excluding the anomalously thin sections in the northern part of the county. The Comanche Peak limestone contains considerable argillaceous material especially in its basal part, and much of it is extensively burrowed.

The Comanche Peak limestone is softer than the overlying Edwards limestone and has eroded into a steep slope which is characteristic of its outcrop throughout the quadrangle. It is massive and where undercut by streams breaks off in house-sized blocks. On aerial photographs the Comanche Peak limestone on north slopes shows as a 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 mapping the Comanche Peak limestone, points at which its boundaries cross roads were placed on aerial photographs. Additional points of contact were mapped at many places between roads. On portions of the photographs in Gillespie County having stereoscopic coverage and on all photographs in Kerr County the boundaries were traced under the stereoscope, and in Gillespie County where stereoscopic coverage is lacking, the boundaries can still be very closely approximated by following the vegetational banding.

Edwards limestone.—The base of the Edwards near Mountain Home is 1,901 feet, and the highest point determined by traverse is 2,254 feet, giving an elevation difference of 353 feet. The rocks are apparently nearly horizontal and about 360 feet of Edwards is present.

The lower boundary of the Edwards limestone, as explained above, is placed at the base of a thin-bedded limestone which is thought to correlate with a similar zone containing some chert farther east in Gillespie County. The Edwards limestone within the Dry Branch quadrangle 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 this variation is clearly shown on aerial photographs by vegetational banding. The outcrop of the Edwards has an average density of vegetation greater than that of the Glen Rose limestone, and in addition the vegetation shows better segregation into bands. Above the abrupt slope of the Comanche Peak limestone the Edwards limestone flattens out into gently sloping surfaces. The hard limestones weather slowly and have only a thin soil covering or are bare and nearly void of vegetation. The softer beds develop a more adequate soil and are thickly vegetated mostly by a 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 artifacts, and because it was used extensively by the aborigines is mostly referred to as flint. The surface mostly slopes so gently and exposures are so poor that a continuous section of the Edwards cannot be measured. Fortunately along Johnson Creek a bluff in combination with a highway cut exposes about 84 feet of Edwards limestone. A new cut along the highway to Junction exposes more Edwards limestone just to the west of the Dry Branch quadrangle and east of Rough Hollow. It is estimated that the base of the section is 95 feet above the base of the Edwards limestone. The section is described below.

Within the Dry Branch quadrangle there is little evidence of the presence of gypsum such as is seen in much of northern Gillespie County. A rather broad bench is present at about the right level for the gypsum horizon, but no collapse structure of the type noted in the gypsum area of north-central Gillespie County is present. Vegetational banding ranges throughout the Edwards within the quadrangle, and if gypsum originally had been present, its removal would have allowed the overlying beds to collapse, destroying the continuity of the banding.

Only one fossil collection, locality 21–9A, was made within the quadrangle, near Duderstadt triangulation station. *Gryphaea mucronata* Gabb has been identified by Dr. Ralph Imlay in the collection. Small fossils in chert are common about 130 feet above the base of the Edwards limestone and are especially abundant in the vicinity of Bench Mark 2024.4 along the western edge of the quadrangle. To the north in the Wendel quadrangle, many large silicified fossils, including considerable petrified wood, occur high in the Edwards limestone. The higher portion of the Dry Branch quadrangle reaches this level and silicified material may be present; however, none was seen.

QUATERNARY DEPOSITS

High gravel.—A high gravel deposit situated along Johnson Creek is a stream deposit and consists chiefly of pebbles, cobbles, and finer materials. Much of the material is limestone, chert, and dolomite from the Edwards limestone, and a small amount of limestone is derived from the Comanche Peak limestone.

Alluvium.—Deposits of alluvium are mostly situated along Johnson Creek and its tributaries. Narrow belts and patches of alluvium follow many of the lesser drainages in the area, especially in the outcrop area of the upper part of the Edwards limestone, but these are insignificant and have not been mapped. The alluvium is composed of sand and silt at the surface and of coarser materials beneath. Some of it is cultivated, and pecan trees growing in alluvium are common along some of the streams.

SUBSURFACE GEOLOGY

No exposed rocks within the quadrangle are older than Cretaceous, and only one well has gone through the Cretaceous. The Owen No. 1 Tatsch well in the northwestern portion of the quadrangle entered Pennsylvanian rocks beneath the Cretaceous as did also the O. W. Killam No. 1 Gibson well in the Wendel quadrangle to the north. Another well rather far distant, the Rowntree No. 1 Kott well in the Spring Creek quadrangle, entered the Honeycut formation of Ordovician age. It is likely that only the upper part of the Lower Ordovician and Mississippian and Pennsylvanian rocks are present beneath the Cretaceous in the quadrangle. Considering the faulting which has taken place in the pre-Cretaceous rocks of the Llano uplift, it is possible, however, that younger Ordovician rocks or even Cambrian rocks may be present, and it is likely that the pattern of the Paleozoic rocks beneath the Cretaceous is as complex as it is at the outcrop in the Llano uplift.

The information about the pre-Cambrian rocks upon which the Paleozoic rocks lie is limited to gravity data. The eastern portion of the quadrangle is a portion of a gravity maximum which centers in the Harper quadrangle to the northeast. The western portion of the quadrangle is a portion of a gravity minimum which appears to center west of the northwestern portion of the quadrangle. In areas of outcropping pre-Cambrian rocks in the Llano uplift, large gravity maxima are associated with Packsaddle schist and large gravity minima are associated with Town Mountain granite (Romberg and Barnes, 1944, and subsequent unpublished data). Diorite was encountered in the Rowntree No. 1 Kott well in the Spring Creek quadrangle. It is unlikely that the maximum is caused entirely by diorite, and since a poorly defined superimposed maximum exists to the west of the well, it is likely that a large diorite mass intruded Packsaddle schist.

Samples from the W. D. Owen No. 1 Ferdinand Tatsch well, submitted to the Bureau of Economic Geology by Messrs. W. D. Owen, B. L. Raborn, and J. R. Sandidge, are described below. The rock units encountered in the well are listed as follows. The position of the Comanche Peak limestone is estimated from surface information. Mrs. Helen Jeanne Plummer is responsible for the identification of the rock units between 1,630 and 1,865 feet. The last sample received is from depth 2,640 to 2,645 feet. Mr. B. L. Raborn in letter of April 19, 1951, stated that the elevation of the well is 2,128 feet.

	Depth to top of unit (feet)
Cretaceous—	
Fredericksburg group—	
Edwards limestone is at surface	—
Comanche Peak limestone and Walnut clay	250
Shingle Hills formation—	
Glen Rose limestone	285
Hensell sand	465
Pennsylvanian—	
Strawn group	885
Smithwick shale	1775
Mississippian—	
Chappel limestone	1865
? limestone	1875
Ordovician—	
Ellenburger group—	
Honeycut formation	1889
Gorman formation, about	2500

A 600-foot well, J. M. Hickey No. 1 John Duderstadt, was drilld near the eastern edge of the quadrangle in the C. F. Priess survey, section 24. The well is 2,280 feet from the north line and 1,350 feet from the east line of the survey and is plotted on the geologic map from these descriptions. Only a driller's log is available, and it suggests that the Edwards limestone and Comanche Peak limestone extend to a depth of about 220 feet, that Glen Rose limestone extends to a depth of 405 feet, and that the rest of the well is in Hensell sand.

MINERAL RESOURCES

The known mineral resources of the quadrangle are limited to nonmetallic substances and water. Outside of the soil, which is mostly used for range land, the most important nonmetallic resources are construction materials.

CONSTRUCTION MATERIALS

Building stone.—Some limestone beds in the Edwards limestone are of about suitable thickness for ledge-stone to be used in building. A few of these beds are of hard, light-colored limestone which should be an attractive building stone.

Road material.—Some of the secondary roads have been surfaced with caliche mostly derived from the weathering of the Edwards limestone. Material of this type, while of use for surfacing secondary roads, is of little value for base-course material in highway construction since it causes freeze damage. Zones are present in the Edwards limestone, however, which should make good base-course material. Some of the rock in the Edwards may be hard enough for use as granules.

Sand and gravel.—Some of the alluvial deposits along Johnson Creek can be used to obtain gravel and perhaps some sand. The material is poorly sorted and would need to be washed and screened. Some zones in the Edwards limestone are of value for the production of crushed stone.

WATER

No attempt was made to investigate systematically the ground water of the Dry Branch quadrangle. Springs were mapped, but no information was obtained about their rate of flow or the quality of water. Two springs were mapped along Fall Branch issuing from the base of the Edwards limestone, and on both Fessington and Welch Branches springs issue from the base of the Edwards limestone. On Smith Branch a spring issues a short distance above the base of the Edwards limestone, and on an unnamed branch between Smith Branch and Bad Man Draw three springs issue from the top portion of the Comanche Peak limestone. On Contrary Branch a strong flow of water issues from the alluvium, and the spring responsible for the flow must be located near the base of the Edwards limestone and be covered by alluvium.

The position of springs in the vicinity of the base of the Edwards limestone in the Dry Branch quadrangle and quadrangles to the east suggests that a zone near the base of the Edwards limestone is an aquifer. While traversing for control, elevations were obtained on the base of the Fredericksburg group, and 15 feet of difference in elevation was found in the vicinity of Johnson Creek. These elevations and others obtained in Gillespie County indicate a gently southwestward-pitching anticline crossing Johnson Creek just upstream from the mouth of Dry Branch. The anticline may account for the lack of springs along Dry Branch and Bad Man Draw, and its damming effect may be responsible for the copious flow of water to the west.

Included in miscellaneous stream-flow measurements on file in the Austin office of the U. S. Geological Survey are two measurements of the flow of Johnson Creek 1 mile downstream from the Heart of the Hills Fish Hatchery. One measurement made August 12, 1902, records 9.00 second feet and another on December 23, 1928, records 6.18 second feet. It is likely that most of the flow recorded is from springs, most of which are in the Dry Branch quadrangle.

The Hensell sand probably extends beneath all of the quadrangle, but its quality as an aquifer is mostly unknown. The Cretaceous rocks are essentially flat between Johnson Creek and the outcrop of the Hensell sand to the north in the Llano River basin; however, because of lateral gradation between the Glen Rose limestone and the Hensell sand, the Hensell sand slopes southward. If the coarser and more permeable portions of the Hensell interconnect from the outcrop southward to the Dry Branch quadrangle, then a plentiful supply of ground water could be present.

The Owen No. 1 Tatsch well encountered water at several horizons. Mr. B. L. Raborn interviewed the driller and in a letter of November 21, 1950, stated that a slight amount of water was encountered at 280 feet; that between 500 and 1,000 feet the sands contain large quantities of water; that the lowest water found is at 1,350 feet; and that no mineralized water has been encountered—all the water being potable.

SELECTED REFERENCES

BARNES, V. E. (1944) Gypsum in the Edwards limestone of central Texas: Univ. Texas Pub. 4301, Jan. 1, 1943, pp. 35–46.

——— (1948) Ouachita facies in central Texas: Bur. Econ. Geol., Rept. Inv. 2, 12 pp.

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

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. Petr. Geol., vol. 15, pp. 67–78.

ROMBERG, FREDERICK, 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.

THOMPSON, S. A. (1935) Fredericksburg group of Lower Cretaceous with special reference to north-central Texas: Bull. Amer. Assoc. Petr. Geol., vol. 19, pp. 1508–1537.

WILMARTH, M. G. (1938) Lexicon of geologic names of the United States, Part 1: U. S. Geol. Survey Bull. 896, 1244 pp.

STRATIGRAPHIC SECTIONS

Downstream Johnson Creek Section

Description	Thickness in feet Interval	Cumulative	Feet above base
Fredericksburg group: about 37 feet measured			
Edwards limestone: present but none measured			
Exposures are poor, but if a thick bed containing chert at 129 feet compares with one in the section on Cottonwood Creek in the Klein Branch quadrangle then the bottom of the Edwards should be at about 126 feet.			
Comanche Peak limestone: probably about 36.5 feet thick			
1. Limestone—see following section for description of a better exposed section.	21	21	105 –126
2. Covered.	15.5?	36.5?	89.5?–105
Walnut clay: not exposed but probably about 0.5 foot thick			
3. Covered.	0.5?	37?	89?– 89.5?
Shingle Hills formation: about 89 feet measured			
Glen Rose limestone member: about 89 feet measured			
4. Covered.	7?	44?	82 – 89?
5. Clay—silty and light olive-gray.	2	46	80 – 82
6. Dolomite and limestone—microgranular dolomite containing some limestone, yellowish gray to grayish yellow, massive, soft, and contains small amount of clay and very fine sand. Insoluble residue amounts to 6.7 percent.	10	56	70 – 80
7. Clay—dolomitic, silty, and white. The surface of the cut weathers much like clay, but beneath this are spherical masses (exfoliation boulders) which have the appearance of dolomite.	3	59	67 – 70
8. Dolomite—microgranular, grayish yellow, and one bed.	2	61	65 – 67
9. Clay—highly calcareous, slightly silty, light olive-gray, and contains a 2-inch limestone bed at 62 feet. Insoluble residue amounting to 36.8 percent between 50 and 60 feet and 20.4 percent between 60 and 70 feet belie the field identification.	15	76	50 – 65
10. Dolomite, clay and limestone—the dolomite is grayish yellow and together with some clay is confined to the lower half of the interval. The clay is mostly light olive-gray. The limestone is ground-up oyster shell, is flaky parallel to the bedding, contains considerable clay, and occupies the upper 2 feet of the interval.	5	81	45 – 50
SHIFT eastward along highway to opposite end of cut.			
11. Clay—silty, light olive-gray, weathers grayish yellow, and is poorly exposed.	5	86	40 – 45
SHIFT across highway in covered interval.			
12. Covered.	4	90	36 – 40
13. Clay—poorly exposed. *Cardium*-like pelecypods are weathering out at about 32 feet, and 2 inches of fragmental oyster shell is present.	5.5	95.5	30.5– 36
14. Limestone—coarse grained, silty, argillaceous, composed mostly of ground-up oysters and other fossils and contains some oysters in fair state of preservation.	0.5	96	30 – 30.5
15. Clay—poorly exposed and may contain some thin dolomite and limestone beds.	5	101	25 – 30
16. Covered—bottom of section at creek level.	25	126	0 – 25

Section Along State Highway No. 27 East of Rough Hollow

Description	Thickness in feet Interval	Cumulative	Feet above base
Fredericksburg group: 50 feet measured			
Edwards limestone: 50 feet measured			
1. Limestone, dolomite, and chert—above 33 feet the effects of solution and weathering are very pronounced and only a semblance of bedding is present between 39 and 40 feet and even here the rock appears to be recrystallized, being coarse grained calcite and highly porous. Above 40 feet the rock has moved, perhaps by slope creep, and has been recemented into a breccia containing brownish gray chalcedonic chert, sublithographic limestone, and some very fine grained dolomite. The gypsum horizon of the Edwards if present in this area should fall somewhere in the upper part of the interval. The elevation of the top of the section is about 2,046 feet.	17	17	33 – 50
2. Dolomite—very fine grained, massive, and in part dissolved. Chert at base of interval is in masses up to 5 inches thick and is yellowish gray streaked by medium light gray.	3	20	30 – 33
3. Limestone—irregular fine grained masses in a solution zone in which some of the blocks are recrystallized to coarse grained, vuggy limestone. Chert in 4-inch nodules in the lower part is medium dark gray, and chert in upper part is pinkish to light brownish gray, contains round objects one-eighth inch in diameter, and other unidentified objects.	4	24	26 – 30
4. Dolomite—very fine grained, light gray, beds 3 to 10 inches thick, and contains chert at top of interval which is dark gray and chalcedonic.	2	26	24 – 26
5. Limestone and dolomite—very fine grained and composed of beds 4 inches thick at base becoming thinner upward, playing out at about 18 feet into a mixture of nodular and pulverulent materials and becoming more pulverulent upward.	9	35	15 – 24
6. Limestone—nodular to irregular masses in pulverulent material and at base of interval 6 inches of yellowish orange material. The overlying beds undulate through about a foot and the evidence points to this interval as being a zone of solution.	3	38	12 – 15
7. Dolomite—very fine grained, light gray; at 10 feet small vugs are lined by calcite, and light gray chert in 1-inch plates is at bottom of interval and at 11 feet.	3	41	9 – 12
8. Limestone—very fine grained, yellowish gray, well bedded, and beds between 6 and 18 inches in thickness. Chert at 2 feet is in plates up to 4 feet long and 2 inches thick and is pale yellowish brown and full of small unidentified objects. The limestone is full of foraminifera, siphoneous algae are common at 3 feet, and from 5 to 8 feet the limestone is mostly a coquinite of *Turritella*-like fossils. Insoluble residue in the limestone, exclusive of chert, amounts to 0.35 percent.	9	50	0 – 9

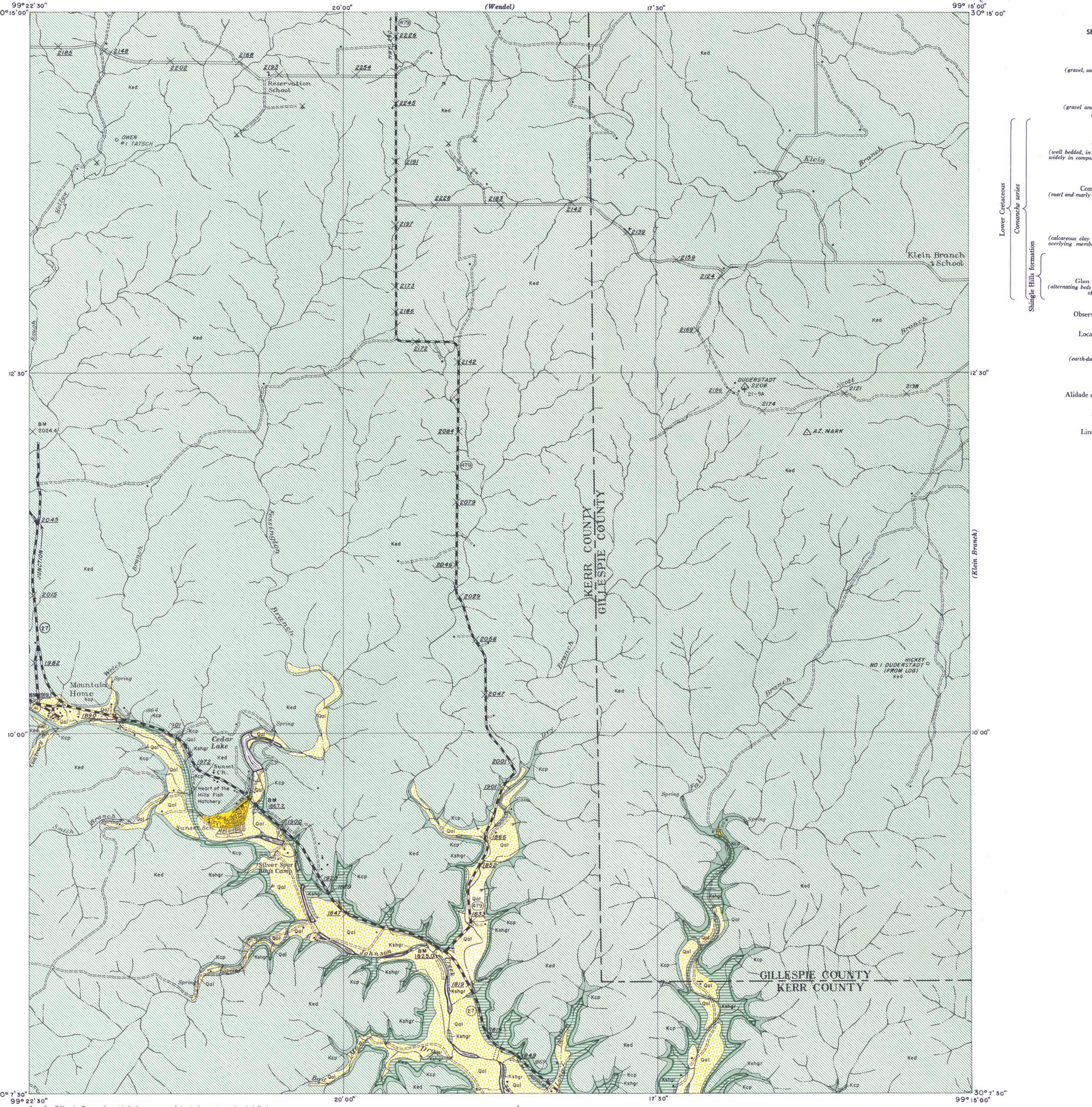
SAMPLE DESCRIPTION

W. D. Owen No. 1 Ferdinand Tatsch Well

	Depth in feet
Limestone—possibly in part dolomitic, very fine grained, between pale yellowish brown and light olive-gray, and in part containing elongated objects which may be oolites, algae, or recrystallized foraminifera	150–160
Limestone—granular, dolomitic, soft, and white. Chert present is apparently from nodules with chalcedonic, brownish gray centers and opaque yellowish gray exteriors	220
Limestone—soft and white to yellowish gray	230–240
Limestone—sublithographic to very fine grained, yellowish gray to white, and contains fossil fragments. Chalcedonic chert between pale and dark yellowish brown is common	240–250
Dolomite and clay—microgranular dolomite and calcareous clay, both of which are yellowish gray	410–420
Clay or limestone—light greenish gray and about equally clay and calcium carbonate	440–450
Sand—poorly sorted, contains some larger angular pieces, and is composed of red stained quartz grains, some of which are cemented by a calcareous cement, and occasional microcline fragments. Some yellowish gray calcareous clay may be cavings	480–490
Sand—poorly sorted, well rounded, in a clay cement, and of a wide variety of colors including red, green, and yellow	510–520
Sand and sandstone—the sand is coarse, angular to subrounded, poorly sorted, and reddish; the sandstone is mostly fine grained, yellowish to pinkish gray, and has abundant dolomitic and argillaceous cement	640–650
Limestone and dolomite—a wide variety of calcareous rocks from sublithographic limestone to microgranular dolomite. Some of the rocks are silty, some sandy, and others are argillaceous	690–700
Sand—very coarse grained, angular to poorly rounded, and contains considerable microcline	755–765
Sand—poorly sorted, rounded to angular, pale reddish brown, and contains some microcline	780–790
Clay—silty, sandy, and light brown	810–820
Sand—same as from 780 to 790 feet except for some calcareous and argillaceous material	820–830
Conglomerate and sand—pebble fragments mostly of Ellenburger chert and dolomite and some of Cambrian glauconitic limestone compose mostly of the upper and lower samples. The middle sample is composed mostly of argillaceous, reddish brown, poorly sorted sand containing some microcline and fragments of pebbles. Some sand is in the upper and lower samples (three samples)	840–870
Shale—greenish gray mostly weathered? to light brownish gray	880–890
Shale—greenish gray	890–900
Sand—same as from 850 to 860 feet. Probably cavings (two samples)	900–920
Shale—greenish gray	950–960
Shale—medium bluish gray (two samples)	960–980
Sand and shale—the sand is fine grained, poorly sorted, mostly angular, light olive-gray, and a few large grains are present which are well rounded. A minor amount of medium dark gray shale is present	1050–1060
Shale—medium gray and in bottom sample contains some siltstone and loose sand (three samples)	1060–1090
Sand and shale—the sand is fine grained, poorly sorted, mostly angular, and light olive-gray. The shale is medium dark gray and forms about 50 percent of the sample (two samples)	1090–1110
Sand—fine grained, poorly sorted, mostly angular, and light olive-gray (three samples)	1110–1140
Shale and sand—medium gray shale and sand in part cemented	1160–1170
Sand—fine grained, poorly sorted, angular to poorly rounded, light olive-gray, and some grains are cemented. A small amount of medium gray shale is present (two samples)	1170–1190
Shale—medium gray. From 1,240 to 1,250 feet there is some fine grained cemented sand and from 1,260 to 1,280 feet some loose sand (ten samples)	1190–1290
Sand—fine grained, in part well rounded, and pale yellowish brown. Small amount of medium dark gray shale (six samples)	1290–1350
Sand—same as from 1,290 to 1,350 feet except that sand is light olive-gray (four samples)	1350–1390
Sand—same as from 1,350 to 1,390 feet except that sand is somewhat coarser	1400–1430
Sand—same as from 1,400 to 1,430 feet except that sand is finer grained	1430–1440
Shale—light to medium gray (nine samples)	1440–1520
Sand—fine grained, poorly sorted, angular, and light olive-gray. Small amount of medium gray shale (six samples)	1530–1600
Shale—medium gray to dark gray and black. The shale is darker colored in the lower part of the interval (twenty-eight samples)	1600–1865
Limestone and shale—the limestone is light olive-gray, very fine grained to microgranular, and contains an occasional crinoid stem. Calcite which appears to be a joint filling is common, and light olive-gray to very light olive-gray translucent chert is present in lower two samples. A small amount of fine grained, well rounded, frosted sand is present in lower part of interval. Shale is abundant probably mostly as cavings (three samples)	1865–1875
Limestone and shale—the limestone is mostly granular, fine grained, medium gray to dark gray, and contains some spicules and other fossil fragments. Some limestone of the type in the interval from 1,865 to 1,875 feet is also present. The top sample contains a small amount of light brown chalcedonic chert. In the bottom sample light greenish gray shale contains well rounded, frosted, very fine grained sand and some pyrite (two samples)	1875–1889
Limestone and shale—the limestone is sublithographic, yellowish gray, and light olive-gray. The shale is light greenish gray and contains very fine grained, frosted, very well rounded sand and some pyrite (two samples). Grains of this sand are a common contaminant for the next several hundred feet	1889–1900, 1910–1915
Dolomite—very fine grained to microgranular and light olive-gray to medium light gray. The top sample contains a small amount of very light gray, chalcedonic chert and a few light olive-gray, sublithographic limestone chips (two samples)	1930–1942
Dolomite—microgranular and very light olive-gray. Chert in lower two samples is in part very light gray and chalcedonic and in part is white and tripolitic; the latter may be interstitial. Part of the chalcedonic chert has minute clear areas (four samples)	1964–1970, 1973–1990
Dolomite—microgranular, light olive-gray, and very light gray. Some very light gray, chalcedonic chert is present in middle sample (three samples)	2068–2076
Dolomite—mostly microgranular, some very fine grained, light gray, and light olive-gray. Chert in upper sample is chalcedonic and very light gray and in next sample is in part light olive-gray and chalcedonic and in part white and porcelaneous (seven samples)	2089–2092, 2098–2115
Dolomite—microgranular and light olive-gray. Chert is absent in some samples and reaches a maximum of 50 percent in one sample. It is mostly chalcedonic and very light gray but from 2,183 to 2,202 feet some of the chert is white and porcelaneous (ten samples)	2152–2215
Dolomite and limestone—the dolomite is microgranular, the limestone is sublithographic, and both are light olive-gray	2245–2248
Limestone—sublithographic and very light gray. Very light gray, chalcedonic chert is abundant, and cleavage rhombs of calcite are common	2248–2250
Dolomite—very fine grained to microgranular and very light gray. Middle sample contains some white porcelaneous chert, and all samples contain very light gray, chalcedonic chert which is especially abundant from 2,265 to 2,275 feet (three samples)	2260–2275
Limestone—sublithographic and yellowish gray. Chalcedonic chert is present in all samples and composes most of bottom sample. In middle sample some of the chert is banded and in bottom sample some white, porcelaneous chert is present	2275–2290
Dolomite—microgranular and very light gray. Chalcedonic chert is scarce	2290–2295
Dolomite and limestone—dolomite microgranular and very light gray; limestone sublithographic and white. Chert white, chalcedonic, and very abundant	2300–2304
Dolomite—microgranular, brownish gray; chert from 2,304 to 2,308 feet white, chalcedonic, and abundant; from 2,308 to 2,310 feet white and porcelaneous to chalcedonic; and from 2,310 to 2,320 feet the same except that it is very scarce (four samples)	2304–2320
Dolomite and limestone—dolomite microgranular and brownish gray and limestone sublithographic and yellowish gray. Very light gray, chalcedonic chert is scarce	2320–2325
Dolomite—very fine grained and brownish gray. Chert scarce	2325–2330
Dolomite—microgranular to very fine grained, yellowish gray, and chert very light gray to white and chalcedonic to subchalcedonic	2330–2335
Dolomite and limestone—mostly sublithographic limestone except from 2,340 to 2,345 feet which is mostly microgranular dolomite and from 2,345 to 2,350 feet which is mostly chert. Chert in other samples ranges from scarce to abundant (four samples)	2335–2355
Limestone—sublithographic. Chert chalcedonic and scarce to abundant (three samples)	2355–2365
Limestone and dolomite—mostly sublithographic limestone and some microgranular dolomite. Chert scarce to abundant, mostly chalcedonic, some porcelaneous, and from 2,400 to 2,410 feet contains sand grains (nine samples)	2365–2414
Limestone—sublithographic and very light gray. Chert white and porcelaneous to chalcedonic	2414–2420
Limestone and dolomite—limestone sublithographic and very light gray; dolomite fine grained, light gray, and some of it contains interstitial porcelaneous chert	2420–2425
Limestone—sublithographic and brownish gray	2425–2430
Limestone and dolomite—limestone sublithographic and brownish gray; dolomite fine grained and light gray; and chert chalcedonic, very light gray, and scarce	2430–2435
Dolomite—very fine grained and light brownish gray; chert porcelaneous, white, and scarce	2435–2445
Limestone and dolomite—limestone sublithographic, dolomite microgranular, and both are very light gray	2455–2460
Dolomite—mostly microgranular, some very fine grained, and very light gray	2460–2465
Dolomite—very fine grained and scarce. Sample mostly chalcedonic and very light gray chert	2465–2470
Limestone—sublithographic, chert chalcedonic, and both very light gray	2470–2475
Dolomite—very fine grained to fine grained, chert chalcedonic, and both very light gray	2475–2480
Dolomite—fine grained and very light gray. Top sample is mostly chalcedonic, very light gray chert, which contains a few sand grains, and rare *Archaeoscyphia* spicules	2480–2490
Dolomite and limestone—dolomite microgranular, limestone sublithographic, and both brownish gray. Chert chalcedonic, very light gray, and some chips contain sand	2490–2495
Limestone—sublithographic, brownish gray, and some chips contain sand	2495–2500
Limestone—sublithographic and yellowish gray to white. The samples contain considerable loose sand (three samples)	2500–2515
Dolomite—very fine grained and very light gray	2515–2520
Dolomite—in part microgranular, very light gray, and contains sand; and in part very fine grained and yellowish gray. The sample contains considerable loose sand	2520–2525
Dolomite—very fine grained and brownish gray. The upper sample contains a small amount of white, porcelaneous chert, and the lower sample contains considerably more, some chips containing sand grains. The lower sample also contains some colorless, chalcedonic chert (two samples)	2525–2535
Limestone—sublithographic, yellowish gray, and some chips contain sand. The sample contains some very light gray, chalcedonic chert	2535–2540
Dolomite—microgranular to very fine grained and very light gray. Very light gray, chalcedonic and white, porcelaneous chert is common	2540–2545
Dolomite—mostly very fine grained and very light gray. Chert is very scarce	2545–2550
Dolomite—microgranular to very fine grained and light gray. Chert is scarce except for abundant white, porcelaneous and colorless, chalcedonic chert in bottom sample. Loose, round sand grains are common (four samples)	2550–2565
Dolomite—microgranular and light gray. White, porcelaneous chert is abundant, one chip of which contains sand grains. Loose round sand is common	2565–2570
Dolomite—microgranular to very fine grained and light gray. Chert is scarce except for middle sample which contains abundant white, porcelaneous chert, and some colorless, chalcedonic chert (three samples)	2570–2585
Dolomite—microgranular, in bottom sample some very fine grained, and light gray (three samples)	2585–2600
Dolomite and limestone—the dolomite is microgranular and light gray; and the limestone is white, sublithographic, and in part oolitic. White, porcelaneous to chalcedonic chert, some of which contains sand, is abundant	2600–2605
Dolomite—microgranular and light gray. Chert scarce	2605–2610
Dolomite—fine grained, and very light gray to light gray. White, porcelaneous, oolitic chert is common and some of the oolites are free	2610–2615
Dolomite—microgranular to very fine grained, and very light gray (two samples)	2615–2625
Limestone and dolomite—the limestone is sublithographic and yellowish gray; and the dolomite is very fine grained and light olive-gray. White porcelaneous to subchalcedonic chert is abundant	2625–2630
Dolomite—very fine grained and light olive-gray. White, porcelaneous to chalcedonic chert is common	2630–2635
Limestone and dolomite—the limestone is sublithographic and yellowish gray, and the dolomite is very fine grained and light olive-gray. Chert is abundant, part of which is chalcedonic and very light gray and the rest is white and porcelaneous. Loose, round sand grains are common	2635–2640
Limestone—sublithographic, yellowish gray, and a few chips contain sand grains. The bulk of the sample is chalcedonic, very light gray chert, and a small amount of white, porcelaneous chert	2640–2645

THE UNIVERSITY OF TEXAS
BUREAU OF ECONOMIC GEOLOGY

GEOLOGIC QUADRANGLE MAPS
No. 17
DRY BRANCH QUADRANGLE



EXPLANATION

SEDIMENTARY ROCKS

QUATERNARY

Qal — Alluvium (*gravel, sand, and silt along stream bottoms*)

Qhg — High gravel (*gravel and sand in terraces along streams*)

UNCONFORMITY

CRETACEOUS — Lower Cretaceous — Comanche series

Ked — Edwards limestone (*well bedded, in part cherty, in part magnesian; varies widely in composition, hardness, and thickness of beds*)

Kcp — Comanche Peak limestone (*marl and marly limestone ranging from nodular at base to well bedded at top*)

Kwa — Walnut clay (*calcareous clay grading upward into the marl of the overlying member; contains a profusion of Exogyra texana*)

Shingle Hills formation

Kshgr — Glen Rose limestone member (*alternating beds of limestone, dolomite, and clay, some of which are arenaceous*)

Observed and inferred contact

+ 21-9A Locality of fossil collection

Tank (*earth-dammed pond for water storage*)

Windmill

2172 Alidade elevation of gravity station

2206 Alidade elevation

Line of described section

Base for Gillespie County from U. S. Department of Agriculture, Agricultural Adjustment Administration, aerial photographs flown by Kargl Aerial Surveys, Ltd., 1938; and for Kerr County from U. S. Department of Agriculture, Soil Conservation Service, aerial photographs flown by Park Aerial Surveys, Inc., 1939–1940.

Scale 1/31,680

1 — ½ — 0 — 1 Mile

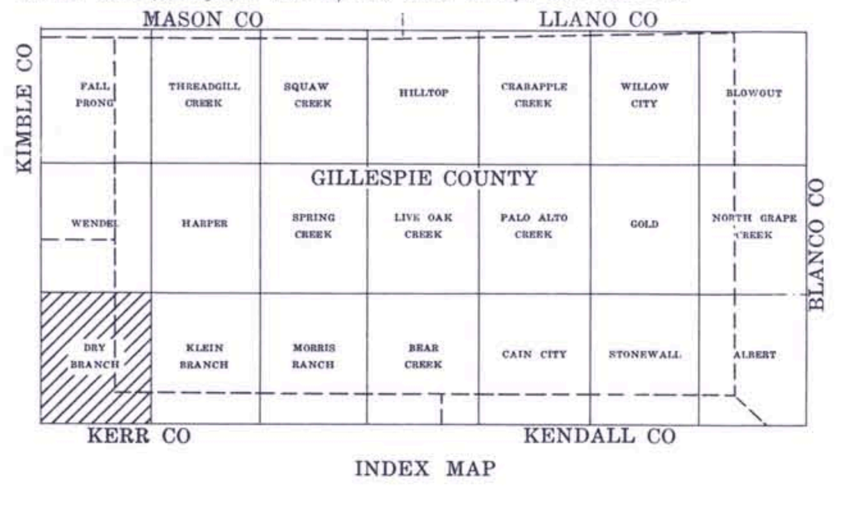
5000 — 2500 — 0 — 5000 Feet

1 — ½ — 0 — 1 Kilometer

Datum is mean sea level

APPROXIMATE MEAN DECLINATION 1947 (10°)

Geology by Virgil E. Barnes 1939–1949
Assisted by T. R. Walker and Louis Dixon
Cartography by J. A. Ayres and J. W. Macon



INDEX MAP

GEOLOGIC MAP OF THE DRY BRANCH QUADRANGLE, KERR AND GILLESPIE COUNTIES, TEXAS

1954