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MINERAL RESOURCE SURVEY
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The information contained in this circular was gathered by a unit of the WPA State-wide Mineralogical Survey of Texas, a project sponsored by The University of Texas, Bureau of Economic Geology. The purpose of this survey is to assemble information concerning mineral resources and to gather other geological data and make them available to the public. With this information in the hands of the public, it is reasonable to suppose that industries of value to the State may be developed. The following report is based on work done in Atascosa County by Work Project No. 18644.

CLAYS AND ROAD MATERIALS IN ATASCOSA COUNTY, TEXAS*
by John H. McCammon, Supervisor

INTRODUCTION

A geological investigation project was established in Atascosa County for two reasons:

- (1) To search for high alumina clays; and
- (2) To search for deposits of road metal

Because of the scarcity of known deposits of suitable road materials in the county, the County of Atascosa contributed to the sponsorship of the project by furnishing transportation for the workers. Extensive coring with 3-inch hand augers revealed several occurrences of relatively high grade clays of the so-called bentonitic type. The search for suitable road materials was less successful.

LOCATION

Atascosa County is situated in southwest Texas. To the north, it is bounded by Bexar County, of which the county seat is San Antonio. Geographically Atascosa County is in the Coastal Plain of Texas. It is, however, just to the south of a line of counties, through or along which run the Balcones and related fault systems, which in southern and central Texas separate the Edwards Plateau from the Coastal Plain.

STRUCTURAL POSITION OF ATASCOSA COUNTY

The major structural divisions of the Coastal Plain of Texas respectively from northeast to southwest are the Sabine uplift, the East Texas embayment, the San Marcos arch, and the Rio Grande embayment. The axes of the latter two, the San Marcos arch and the Rio Grande embayment, lie roughly equidistant from the area enclosed by the boundaries of Atascosa County.

The major structural control of deposition of sediments by these two features is well reflected on the accompanying map of the areal geology of the county. From northeast to southwest the outcrop of several formations in the main widens considerably; in a few instances the increase in width is at the expense of other formations. The comparatively narrower outcrops of the respective formations in the northeast part of the county is the effect of deposition on the flank of the San Marcos arch, which is a structurally elevated area, an anticline, the axis of which plunges Gulfward to the southeast or conversely rises landward to the northwest. Thus in general the outcrops of formations are thinner in the northeast than elsewhere in the county because they are both nearer to the arch and to the more elevated portion of it.

Contrastingly, the outcrops are progressively wider to the southwest because they were deposited farther from the San Marcos arch¹ and they were being laid down on the gentle slope of a large basin, the Rio Grande embayment, which becomes broader and deeper toward the Gulf.

STRATIGRAPHY

Mapping of the outcrop of formations was carried on in a limited way while coring for clays of high alumina content. Time did not permit detailed mapping; hence, on the accompanying map the contacts are shown only as solid lines where coring or good exposure made it possible to place the contact definitely; elsewhere, contacts are indicated by dashed lines. The areal extent and upper boundary of the Wilcox was taken directly from the geologic map of J. T. Lonsdale and M. T. Halbouty²; similarly the small outcrops of Frio and Catahoula rocks in the extreme southeast corner of the county were taken from the U.S. Geological Survey Geologic Map of Texas, 1937. These outcrops were not recognized in traversing this area.

No attempt was made to map either the young alluvial deposits of sand, gravel, and mud adjoining the drainage system or the sheet wash gravel scattered thinly but extensively in the southwest part of the county.

*Assistance in the preparation of these materials was furnished by the personnel of Work Projects Administration Official Project Nos. 165-1-66-695 and 265-1-66-214.

¹Compare Stenzel, H. B., The Geology of Leon County, Texas: Univ. Texas Bull. 3818, p. 187, 1938.

²Lonsdale, J. T., Geology and ground-water resources of Atascosa and Frio Counties, Texas: U.S. Geol. Survey Water-Supply Paper 676, 90 pp., 1935.

The normal sequence of formations in Atascosa County is:

Catahoula formation (basal beds only)
 Frio clay
 Jackson group
 Yegua formation
 Crockett formation
 Stone City beds
 Sparta sand
 Weches glauconitic marl
 Queen City sand
 Reklaw formation
 Carrizo sand
 Wilcox group (upper part only)

All are Eocene in age, except Frio and Catahoula, which are questionably Oligocene and Miocene respectively.

Of this sequence the Jackson, Yegua, Crockett, Queen City, Reklaw, and Carrizo were cored. Only the Jackson, Yegua, Crockett, and Carrizo were found to contain significant quantities of desirable clay. For detailed description of these Eocene formations, the following references may be consulted:

Lonsdale, J. T., *Geology and ground-water resources of Atascosa and Frio counties, Texas*: U.S. Geol. Survey Water-Supply Paper 676, 90 pp., 1935.

Plummer, F. B., *The Cenozoic systems, in The Geology of Texas, Vol. I, Stratigraphy*: Univ. Texas Bull. 3232, pp. 519-818, 1932 (1933).

Stenzel, H. B., *The geology of Leon County, Texas*: Univ. Texas Bull. 3818, 295 pp., 1938.

CARRIZO SAND

On the W. J. Miller farm, about 7 miles airline, slightly east of north, from Poteet, occurs a deposit of high-grade, light gray clay.³ The area underlain by this clay is at least two acres; the thickness of the deposit is up to 9 feet.

Log of 3-inch core hole 250 yards west of W. J. Miller home.

	From	Depth To
Soil, light brown, clayey, sandy	0	1'5"
Clay, brown, sandy, with clay-ironstone pebbles.....	1'5"	2'10"
Clay, yellow-brown, sandy	2'10"	3'8"
Sand, yellow, clayey	3'8"	4'6"
Clay, yellow-brown, sandy	4'6"	6'8"
Clay, light gray	6'8"	15'5"
Clay, light gray with limonitic, yellow laminae	15'5"	15'10" T.

This clay burns white, according to W. J. Miller. From a taste test, it apparently contains no free silica. It is reported also to be a good drilling mud.

No other clay, free of silica, carbonaceous matter, or iron (megascopically examined) was found in the immediate area. In several holes tested as deep as 28 feet, chocolate-brown, yellow, and dark gray clays were found, but the presence of gypsum, limonitic staining, lignitic material, and frequently free silica detracts from their value.

The Carrizo is of greater economic importance in the county for its deposits of relatively pure sand. Several pits have been operated for use of the sand for structural purposes and in the glass and chemical industries. Sand is washed, dried and graded for size at the plant of the Espey Silica Sand Company in the northern part of the county.

Location. — Property of J. E. Espey: sand pit of Espey Silica Sand Company, located in northern part of Atascosa County, a short distance west of State highway No. 281, 18 miles south of San Antonio. Prior to the war the main production of the plant was sent to Monterrey, Mexico, where the silica was converted to sodium silicate (water glass). Sand from this pit was supplied to the Three Rivers glass plant, operations of which have now ceased.

REKLAW FORMATION

In the northeastern quarter of the county, the Reklaw may be divided into two members, a lower sand member, the Newby, and an upper shale member, the Marquez.⁴ To the southwest along the strike, the Marquez becomes increasingly sandy; thus coring of the shale member was concentrated within the northeastern quarter.

³All statements regarding the quality of the respective clays are based upon examination in the field. In general, the greater the leaching a clay has undergone, the whiter the color and the higher the alumina content. Likewise, a clay is considered of higher quality if it is free of gypsum, carbonaceous or lignitic material, excessive iron or calcium carbonate content, and sand.

⁴Stenzel, H. B., *The geology of Leon County, Texas*: Univ. Texas Bull. 3818, p. 65, 1938.

Typical log of upper Marquez, from core hole 800 feet north of the E. D. Palmer farm house.

	Depth	
	From	To
Soil, gray, sandy	0	1'9"
Subsoil, yellow and gray, clayey, sandy	1'9"	2'7"
Sand, interbedded, yellow and gray	2'7"	4'6"
Sand, brownish yellow, micaceous, clayey	4'6"	6'
Sand, light yellow, micaceous with caliche	6'	10'3"
Sand, yellow, micaceous, with gray, silty clay streaks	10'3"	12'1"
Clay, light yellow-gray, lignitic, with yellow, silty micaceous clay streaks	12'1"	12'6"
Clay, interbedded, yellow and gray	12'6"	12'9"
Clay, limonitic, yellow	12'9"	13'3"
Clay, gray	13'3"	15'7"
Clay, interbedded, yellow and gray, lignitic	15'7"	15'10"
Clay, gray	15'10"	18'1"
Clay, interbedded, yellow and gray, lignitic	18'1"	21'6"
Clay, gray-yellow, lignitic, with streaks of gray clay	21'6"	21'10"
Same as next above with clay-ironstone streaks	21'20"	23'
Clay, gray, with light-gray-yellow, sandy clay streaks	23'	23'5"T.

Log of core hole of lower Marquez, 0.8 mile north of core hole described above.

	Depth	
	From	To
Soil, black, sandy, clayey	0	8"
Subsoil, black, waxy, clayey	8"	1'9"
Clay, dark gray-yellow with clay-ironstone pebbles	1'9"	3'
Clay, gray-yellow, sandy	3'	3'6"
Clay, yellow, sandy, gypsiferous	3'6"	4'2"
Clay, gray, gypsiferous, with yellow streaks	4'2"	4'5"
Clay-ironstone, limonitic, yellow	4'5"	4'7"
Clay, gray, gypsiferous	4'7"	6'
Sand, yellow, clayey	6'	6'11"
Clay, yellow-brown with gypsum	6'11"	8'9"
Clay, light chocolate	8'9"	9'3"
Clay, chocolate with red and yellow streaks	9'3"	10'4"
Clay, yellow with thin red clay laminae	10'4"	10'9"
Sand, red and yellow, clayey	10'9"	11'1"
Sand, fine, light yellow	11'1"	11'5"
Sand, gray and bright yellow, micaceous, clayey	11'5"	11'8"
Sand, fine, yellow, micaceous	11'8"	15'
Clay, gray sandy, interbedded with yellow sandy clay	15'	16'2"
Clay-ironstone, yellow, limonitic	16'2"	17'
Clay, gray with minor streaks of yellow clay	17'	17'9"
Clay, light brown-yellow	17'9"	18'2"
Clay, gray with minor clay-ironstone hard streaks	18'2"	18'8"T.

In a series of some fifty holes in this area there was not found any clay which megascopically could be classified as high grade. Similarly, coring of the upper Reklaw or Marquez member in and around the Friendship School, and southwest along the strike to south of the towns of Leming and Poteet, failed to uncover any of the desired clays. It appears then, from the coring done, that the Marquez shale member of the Reklaw is from top to bottom too frequently gypsiferous and/or lignitic even for the minimum standards of the ceramic industry. In this area the Reklaw cannot be considered as a source of alumina.

QUEEN CITY SAND

Very limited coring was done in the Queen City. A reported white clay on the Ridgeway ranch, about 2 miles northeast of Verdi, was investigated. The following log indicates that the clay is very arenaceous.

Log of test hole 200 yards north of windmill on Ridgeway ranch.

	Depth	
	From	To
Sand, gray-brown, alluvial	0	9"
Sand, variegated, gray, brown, and yellow, clayey	9"	1'8"
Sand, yellow-brown and gray, clayey	1'8"	2'5"
Sand, gray	2'5"	3'1"
Sand, interbedded, gray and yellow, clayey	3'1"	3'11"

	Depth	
	From	To
Sandy, gray, clayey.....	3'1"	6'4"
Sand, gray, brown and yellow, clayey, with ferruginous pebbles	6'4"	6'11"
Sand, light gray, clayey	6'11"	8'2"
Sand, thinly laminated, gray and yellow.....	8'2"	9'2"
Sand, gray-yellow, clayey	9'2"	9'11"
Clay, gray-white, sandy	9'11"	10'2"
Sand, brown-yellow	10'2"	11'6"
Sand, gray-white	11'6"	13'9"
Sand, interbedded, yellow and gray.....	13'9"	16'
Sand, gray-white	16'	17'4"
Sand, light yellow	17'4"	18'8"
Sand, orange-yellow, micaceous, glauconitic	18'8"	19'8"
Sand, gray-yellow, glauconitic, micaceous	19'8"	20'3"T.

A high-grade deposit of volcanic ash occurs in the basal beds of the Queen City about 2 miles east of Leming on the property of H. O. Harrison. Mr. Harrison has dug a pit 8 feet deep in which volcanic ash extends almost to the surface. Test holes 100 feet apart failed to encounter any more of the ash. Apparently the deposit is small laterally, but vertically is quite thick, as shown by the log.

Log of test hole on H. O. Harrison property about 2 miles east of Leming.

	Depth	
	From	To
Ash, fine, white (weathered sides of pit).....	0	8'
Ash, gray-white, drying white.....	8'	10'2"
Ash, light gray-yellow	10'2"	11'6"
Clay, bright red, ferruginous.....	11'6"	11'10"
Clay, yellow, sandy.....	11'10"	13'2"
Clay-ironstone, limonitic, yellow	13'2"	13'5"
Sand, fine, light gray, muscovitic.....	13'5"	16'
Same as next above with thin yellow sand laminae	16'	20'3"
Sand, light gray-white, muscovitic	20'3"	20'6"T.

CROCKETT FORMATION

Two deposits of bentonitic type clays were discovered in the Crockett formation. Both of these deposits are in about the middle Crockett. It is possible that these two deposits are a bentonitic horizon that is continuous along the strike. The deposit in the eastern part of the county is half a mile south of the Black Hills schoolhouse.

Log of test hole one-half mile south of Black Hills schoolhouse.

	Depth	
	From	To
Soil, brown, sandy, clayey.....	0	1'2"
Subsoil, dirty yellow-gray, brown, sandy clayey with ironstone pebbles	1'2"	1'8"
Clay, dirty yellow-gray, with caliche and ironstone pebbles	1'8"	2'2"
Clay, drab yellow, with caliche.....	2'2"	3'4"
Clay, gray, gypsiferous, bentonitic, with yellow-brown ferruginous pebbles.....	3'4"	4'9"
Clay, gray, bentonitic, gypsiferous, with yellow-brown and red clay laminae	4'9"	5'4"
Same as next above; no gypsum	5'4"	7'
Clay, gray, silty, with sulfur-yellow seams	7'	8'2"
Clay, gray, silty, with red and yellow-brown seams	8'2"	9'3"
Clay, green-gray, bentonitic, with yellow silty clay.....	9'3"	10'1"
Clay, creamy white, bentonitic	10'1"	11'6"
Clay, gray, bentonitic, gypsiferous with yellow-brown streaks	11'6"	11'11"
Clay, gray, silty, gypsiferous, variegated, red, yellow-brown and yellow streaks	11'11"	15'
Clay, light gray, gypsiferous with many sulfur-yellow streaks	15'	16'
Sand, light gray, muscovitic, very fine; some sulfur-yellow streaks	16'	19'T.D.

The second deposit is about 6 miles southwest of Jourdanton. The coring was carried out along the first north-south road west of the Jourdanton-Tilden highway.

Log of core hole 800 feet south of small bridge nearest to northern intersection of Jourdanton-Tilden road.

	From	Depth	To
Soil, gray-black, sandy, clayey	0		1'6"
Subsoil, gray, clayey	1'6"		2'11"
Same as next above with caliche	2'11"		3'
Clay, dirty yellow-gray, sandy, slightly bentonitic	3'		4'11"
Clay, slightly yellow, green-gray, bentonitic	4'11"		5'9"
Clay, light green-gray, sandy, bentonitic	5'9"		8'10"
Clay, green-gray, sandy, bentonitic, gypsiferous with yellow-brown streaks	8'10"		9'9"
Clay, gray, bentonitic, with yellow streaks	9'9"		10'7"
Clay, yellow-gray, bentonitic	10'7"		11'3"
Clay, gray, sandy, gypsiferous, with yellow-brown seams	11'3"		12'7"
Clay, gray, silty, gypsiferous with red streaks	12'7"		13'5"
Sand, fine, variegated, green, red, and red-brown gypsiferous, muscovitic	13'5"		13'9"
Sand, fine, green-gray, muscovitic, gypsiferous	13'9"		16'2"
Sand, yellow, gypsiferous, muscovitic, silty	16'2"		16'7"

YEGUA FORMATION

In McMullen County deposits of a high-grade bentonitic type clay occur in the Yegua formation. The deposit is on the Franklin Murray ranch and is located about 6 miles south of the Atascosa County line. This clay is shipped to Corpus Christi, Texas. Coring across the strike of selected outcrops of the Yegua in Atascosa County failed to find any occurrences of desirable clay comparable to that of McMullen County. A small deposit of bentonitic clay, however, does occur about one-half mile southwest of the old Hitchcock School.

Log of core hole one-half mile southwest of old Hitchcock School.

	From	Depth	To
Soil, dark gray-brown, clayey, sandy	0		1'7"
Subsoil, red-brown, clayey, sandy	1'7"		3'1"
Subsoil, variegated brown, dirty yellow, sulfur-yellow, sandy, clayey	3'1"		4'7"
Sand, carbonaceous, gray and brown, clayey	4'7"		5'6"
Clay, light gray, ashy with sulfur-yellow streaks	5'6"		6'9"
Sand, gray, gypsiferous, clayey with yellow streaks	6'9"		7'11"
Same as next above with orange and red-brown streaks	7'11"		8'10"
Sand, fine, light gray, carbonaceous, with sulfur-yellow impregnations	8'10"		14'2"
Clay, light gray, ashy, with some yellow-brown laminae	14'2"		14'10"
Clay, white-drying, creamy white, bentonitic	14'10"		16'6"
Clay, slightly yellow-gray, gypsiferous, ashy	16'6"		18'
Clay, slightly brown-gray, carbonaceous, gypsiferous	18'		18'7"T.

JACKSON FORMATION

In the Jackson formation occur two rather extensive deposits of bentonitic-type clay. On the Guy Smith ranch, 4½ miles by airline southeast of McCoy, hard white-drying, bentonitic-type clay is present in the peninsula-like outcrop of basal Jackson. The thickness of the deposits is 3.5 to 4 feet across the strike and from 1 to 15 feet deep. It is 730 feet wide and 450 feet long along the strike.

Log of combined test pit and core hole on Guy Smith ranch, 4½ miles by airline southeast of McCoy.

	From	Depth	To
Soil, black, sandy, clayey	0		1'5"
Subsoil, dark and dirty yellow-gray, sandy, clayey	1'5"		2'5"
Clay, gray-yellow, sandy with some caliche	2'5"		3'
Clay, light gray, hard, cross-bedded, bentonitic with a few yellow streaks	3'		4'5"
Clay, white-weathering, yellow-gray, bentonitic with black seams	4'5"		4'7"
Clay, gray-white, hard, cherty, bentonitic with red seams	4'7"		5'10"
Clay, light green-gray, hard, thinly bedded, bentonitic	5'10"		6'6"
Clay, green-gray, hard, bentonitic with plant remains; breaks like flags	6'6"		7'
Clay, light yellow-gray, bentonitic	7'		8'4"
Sand, light, slightly green-gray-yellow, fine	8'4"		9'2"
Clay, yellow-gray, ashy	9'2"		9'10"
Ash, fine, white, volcanic	9'10"		12'5"

	Depth	
	From	To
Sand, fine, white-gray, with black carbonaceous specks	12'5"	13'
Sand, fine, yellow-white	13'	14'6"
Same as next above, with thin, yellow sand laminae	14'6"	16'3"
Sand, very fine, gray-white, with light brown sand streaks	16'3"	17'9"
Clay, yellow-green-gray, gritty, bentonitic	17'9"	18'3"
Clay, hard, brown-gray, sandy	18'3"	18'9"
Clay, creamy white, sandy, bentonitic	18'9"	19'1" T.

An extensive deposit of bentonitic-type clay occurs on the Harrison-Abercrom ranch. The occurrence is about 1 mile west of Metate Creek on the Campbellton-Christine road. The road log is as follows: From Campbellton go north on U.S. highway No. 281 1.6 miles; turn left (west); go 5.7 miles on Christine road to locked gate on left; dim trail leads to old cut in the hillside about 500 yards from the gate. The deposit is at least 2500 feet long and 250 feet wide. Megascopically examined, the thickness of sand-free bentonitic clay is at least 5 feet.

*Log of bentonite pit 1 mile west of Metate Creek on
Campbellton-Christine road.*

	Depth	
	From	To
Soil, gray-black, sandy, clayey	0	2'1"
Subsoil, gray-brown, sandy, bentonitic, clayey with yellow-brown streaks	2'1"	3'
Same as next above, with sulfur-yellow clay laminae one-half to 1 inch apart	3'	3'10"
Clay, slightly gray-brown, white, sandy, bentonitic, with yellow-brown clay laminae one-half to 1 inch apart	3'10"	5'6"
Clay, gray-white, bentonitic, with light purple streaks and with yellow-brown seams 1 to 3 inches apart	5'6"	6'5"
Clay, pale yellow to olive to buff, bentonitic	6'5"	11'2"
Clay, white, bentonitic	11'2"	11'8"
Clay, gray-brown, bentonitic, becoming chocolate-brown and siltier downward; yellow laminae one-half to 3 inches apart	5'6"	6'5"
Clay, pale yellow to olive to buff, bentonitic	6'5"	11'2"
Clay, white, bentonitic	11'2"	11'8"
Clay, gray-brown, bentonitic, becoming chocolate-brown and siltier downward; yellow laminae one-half to 3 inches apart	11'8"	18'7" T.D.

ROAD MATERIAL

In the northern half of the county, road metal of the gravel type is absent. Terraces along the major streams are composed of sand and silt. The probable explanation of the lack of gravels is the fact that the headwaters of the major streams are in the Carrizo and Wilcox formations, both of which are void of coarse clastics. Headwaters of major streams in adjacent counties arise or cross the chert and flint-bearing horizons of the Edwards formation. Hence the only source of road metal for the northern part of the county is the Weches formation. The Weches has been outlined on the accompanying map to facilitate search for deposits of ferruginous sandstone other than those already known.

In the southeastern part of the county the partially indurated volcanic ash beds (Jackson formation) along the Campbellton-Fashioning road now serve as a source of a fairly satisfactory road metal. In the southwestern part of the county there is no lack of gravels. These gravels are of two types: the terrace gravels of San Miguel Creek and the gravels which cover as veneer both the hills and slopes of the area (Uvalde?). The well developed terraces along San Miguel Creek may be seen on the road from Davis to Hughey's ranch. About 300 yards west of the road on the north side of San Miguel Creek, about 16 feet of terrace sand and gravels overlie about 6½ feet of plant-bearing, blue-green and chocolate-brown, silty shales of the Yegua formation. Three gravel horizons are exposed, the thickest of which is 3½ feet. From the reconnaissance done, it appears that these terraces along San Miguel Creek are the best source of an easily worked road metal supply in the county.

