GEOLOGY OF BALDWIN COUNTY, ALABAMA

GEOLOGICAL SURVEY OF ALABAMA

MAP 94

GEOLOGICAL SURVEY OF ALABAMA

Philip E. LaMoreaux State Geologist

DIVISION OF WATER RESOURCES

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MAP 94

GEOLOGY OF BALDWIN COUNTY, ALABAMA

By Philip C. Reed

UNIVERSITY, ALABAMA

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1971

STATE OF ALABAMA

Honorable George C. Wallace, Governor

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University, Alabama July 28, 1971

Honorable George C. Wallace Governor of Alabama Montgomery, Alabama

Dear Governor Wallace:

Transmitted herewith is Map 94, "Geology of Baldwin County, Alabama." It is one of a special series of geologic maps that we are issuing for each of our counties.

The map is complete with text and describes the types of rocks that are exposed, their thickness, physical character, and in some instances their water- and mineral-bearing characteristics. Where possible, geologic structure is shown, indicating the attitude of the rocks: for example, if they are flat lying, faulted, broken, or folded. These maps provide the kind of data needed to aid in the development of planning the location of a highway, a site for a large plant, the location of water or mineral resources, the location of dams and other waterway development projects, and for many other purposes. This series of reports and maps has been prepared to aid in the full development of Alabama's resources and to supply information for adequate environmental planning, management, and control.

Respectfylly,

Philip E. LaMoreaux State Geologist

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GEOLOGY OF BALDWIN COUNTY, ALABAMA

By Philip C. Reed

The economic growth of an area is related in part to the availability of natural resources and to their development. The purpose of this map is to aid in determining the occurrence and availability of water and other mineral resources by outlining the distribution of geologic units in which the resources occur. The map was prepared by the U.S. Geological Survey, Water Resources Division, in cooperation with the Geological Survey of Alabama as a part of the mineral resources study of southwest Alabama. The economic mineral investigation phase of the study is being made by the Economic Geology Division and the Paleontology, Stratigraphy, and Geophysics Division of the Geological Survey of Alabama.

GENERAL STRATIGRAPHY

Geologic units that crop out in Baldwin County are of Tertiary and Quaternary age. The units, in ascending order, are: the Miocene Series undifferentiated, the Citronelle Formation in the Pliocene Series, high terrace deposits in the Pleistocene Series, and alluvium and low terrace deposits in the Pleistocene and Holocene Series (see explanation on map). They are of sedimentary origin and consist of sand, sandstone, silt, gravel, and clay. The Miocene Series and the Citronelle Formation strike northwestward and dip southwestward from 5 to 50 feet per mile. The more gentle dips generally occur at or near the outcrop of the Citronelle Formation. Displacement of subsurface beds due to faulting occurs in northern parts of the county; however, these structures cannot be defined because of a lack of traceable marker beds exposed in the outcrops.

Geologic contacts in Baldwin County as shown on the map, except in a few areas where modifications were necessary, correspond closely with or agree with those mapped by Carlston (1950).

TERTIARY SYSTEM

MIOCENE SERIES UNDIFFERENTIATED

The Miocene Series is the oldest geologic unit exposed in Baldwin County. It crops out in the northern and central parts of the county and overlies the Oligocene Series in the subsurface. The series ranges in thickness from 100 feet in the northern part of the county, where beds in the lower part crop out, to about 3,000 feet in the subsurface in the southernmost part.

The Miocene consists chiefly of light-gray, yellowish-gray, yellow, and white laminated to thinbedded and massive clay, sand, and sandy clay. The sands generally range from fine- to coarse-grained and locally are crossbedded. In the outcrop, the beds weather to a variety of colors, some distinctly mottled. Downdip the lower part of the series in the subsurface contains beds of light-gray, greenish-gray, and brownish-gray partially dolomitic fossiliferous limestone.

Distinct beds of light-gray massive sandy clay at the top of the Miocene Series contrast sharply with gravelly sand, some of which is limonite-cemented, in the overlying Citronelle Formation. The clays are exposed in cuts along U.S. Highway 90 at Styx River in sec. 15, T. 6 S., R. 6 E. (fig. 1).

Geologic section in road cuts along U.S. Highway 90 at Styx River in sec. 15, T. 6 S., R. 6 E.

> Thickness (feet)

Citronelle Formation:



Figure 1.—Geologic section in road cuts along U.S. Highway 90 at Styx River in sec. 15, T. 6 S., R. 6 E.

Geologic section-Continued

Thickness	
(feet)	

Miocene Series:

3.	Clay, light-gray, weathering pink, maroon, and	
	yellow, sandy	16.5
2.	Covered	16.5
1.	Clay, light-gray, sandy; contains borings,	
	some limonite-cemented	27.5

Geologic sections in the Miocene Series in Baldwin County are also exposed northwest of Bay Minette along State Highway 59 and in stream valleys in the northern part of the county near Rabun and northwest of Redtown.

PLIOCENE SERIES

CITRONELLE FORMATION

The Citronelle Formation unconformably overlies the Miocene Series and crops out in central and southern parts of the county, but there are some outliers in the northern part. The formation is as much as 130 feet thick (Carlston, 1950, p. 1120) and consists of dark reddish-brown gravelly sand, which locally contains light-gray clay balls and partings, and light-gray, orange, and brown sandy clay. Gravel in the Citronelle in Baldwin County generally is light-colored quartz that is, in some exposures, as much as 1 inch in diameter. Lenticular beds of lightgray to orange-brown sandy clay and clayey sand that are 5 to 15 feet thick are interbedded with gravelly sands in many areas. The base of the formation is marked in many exposures by a dark yellowishbrown limonite-cemented sandstone bed that locally contains gravel (fig. 1). A similar gravelly sand overlying massive clay is present about 25 feet below the contact; however, the upper horizon was mapped as the Citronelle-Miocene boundary because it is exposed over a broader area and because the clay is present throughout the area and is not lenticular and discontinuous as are clavs in the Citronelle. The Citronelle is exposed 4 miles northeast of Stockton on an unnumbered paved road in SW1/4SE1/4 sec. 29, T.1 N., R.3 E., and 2.5 miles northwest of Stapleton on an unnumbered paved road in SE¼SE¼ sec. 24, T. 3 S., R. 2 E. (fig. 2).

Geologic section 2.5 miles northwest of Stapleton along unnumbered paved road in SE4SE4 sec. 24, T. 3 S., R. 2 E.

1	Thic	kness
	(fe	et)

Citronelle Formation:

8.	Sand, light-brown, fine- to coarse-grained with pea gravel, crossbedded; scattered coarse mica flakes, and sinuous ferruginous	
	layers of sandstone and conglomerate at	
7.	Clay light-gray mottled dusky-red, sandy	10
	weathers to gravish-orange sand	3
6.	Covered	8
5.	Sand, grayish-orange, fine-grained, deeply	
	weathered with dusky-brown limonite	
	pebbles on surface	2
4•	Sand, readisn-brown, moderate readisn-brown,	
	slightly micaceous, with some nea-size gravel	
	in places, weathered limonite pebbles and	
	limonitic sandstone fragments on surface of	
	exposure. Gravel is predominantly quartz	40
3.	Covered	10
2.	Sand, light-brown and very pale orange,	
	nne- to coarse-grained, crossbedded with	
	pea gravel stringers: ferruginous sand and	
	gravel conglomerate ledge at base	4
Mioce	ne undifferentiated:	

alocene undifferentiated:

1. Clay, light-gray, mottled dusky red, sandy.... 3

QUATERNARY SYSTEM

PLEISTOCENE SERIES

HIGH TERRACE DEPOSITS

Several relatively flat-lying terrace deposits unconformably overlie older geologic units in many parts of the county. Most of the larger terrace deposits are adjacent to the flood plain of the Mobile River. The bases of the terrace deposits generally range in altitude from 60 to 210 feet. These terraces have been separated by Carlston (1950, p. 1126) into the Coharie and Penholoway terraces. The base of the Coharie terrace generally ranges in altitude from 200 to 210 feet and that of the Penholoway from 60 to 135 feet. The Penholoway terrace, the most extensive in the county, extends from Bay Minette Creek to Little River. The terrace deposits are usually 5 to 30 feet thick but are as much as 50 feet thick in some areas. They consist chiefly of white, gray, brownish-red, and orange fine- to coarse-grained sand



Figure 2.—Geologic section 2.5 miles northwest of Stapleton along unnumbered paved road in sec. 24, T. 3 S., R. 2 E.

that is gravelly in many exposures. Lenticular beds of light-gray, orange, and yellow sandy clay are exposed in some localities.

PLEISTOCENE AND HOLOCENE SERIES

ALLUVIAL DEPOSITS

Low terrace deposits, alluvium, and beach and deltaic deposits unconformably overlie older geologic units in lowland areas in many parts of the county. They consist of white, gray, orange, and brown, locally fossiliferous, very fine to coarse-grained sand that is gravelly in many exposures. Gray and orange sandy clay is interbedded with the sand in some exposures. The alluvial deposits generally are less than 50 feet thick except in the Mobile River flood plain where they are as much as 150 feet thick. Low terrace deposits of Pamlico age (Carlston, 1950. p. 1127) between altitudes of 20 and 30 feet in the southern part of the county are not separated from the undifferentiated alluvial deposits because their lithology and altitude are similar to those of the more recent stream and beach deposits.

ECONOMIC NOTE

GROUND WATER

Large supplies of water suitable for industrial, irrigation, and municipal use are available throughout the county. Permeable fine- to coarse-grained sands in the Miocene Series are capable of yielding 1 million gallons per day or more to individual wells in a large part of the county. The Oligocene and Eocene Series underlying northern parts of the county, the Citronelle Formation in central and southern parts, and alluvium in the Mobile River basin also are potential sources of large supplies of ground water.

PETROLEUM

Two oil fields in the northern part of the county, the South Carlton Field and the recently discovered Tensaw Lake Field, produce oil from the Cretaceous Series.

CLAY

Clay deposits in the Miocene Series near Marlow in the southern part of the county are utilized for brick manufacturing. Other potential sources of clay are the Citronelle Formation and terrace and alluvial deposits.

SAND AND GRAVEL

Sand and gravel are utilized for road building and other construction purposes in most parts of the county. Sand and gravel occur in commercial quantities in the Citronelle Formation and in high terrace and alluvial deposits adjacent to the Tensaw, Mobile, and Alabama Rivers. Sand also occurs in the Miocene Series in several areas.

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