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MINERAL RESOURCES OF ESCAMBIA
COUNTY, FLORIDA

By

Steven M. Spencer, P.G. #319,
Ed Lane and Ronald W. Hoenstine

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MINERAL RESOURCES OF ESCAMBIA COUNTY, FLORIDA
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INTRODUCTION

In recent years, considerable attention has focused on Florida's rapid development, the accompanying population increase, and their effect on the state's important mineral resources. Frequently, this development occurred in areas underlain by mineral deposits, precluding their extraction. The economics associated with these mineral resources represent substantial employment and income to the private sector as well as taxes to county and state governments. Furthermore, knowledge of mineral resource locations can aid land-use zoning decisions to assist in community environmental resource conservation.

In order to assist county officials, the Florida Geological Survey (FGS) initiated an investigation of Escambia County's mineral resources at the request of the Escambia County Department of Planning and Zoning. The objectives were to identify potential mineral resource areas and to present the results in a format appropriate for use by city and county planners. This mineral resource assessment is general and is intended as a land-use planning tool. Concerns about, or interest in any specific sites would require detailed geological research beyond the scope of this investigation.

A knowledge of Escambia County's geologic resources is basic and integral to the process of initiating, developing, and implementing effective land-use decisions. The information presented here will be useful to planners and officials in their analyses of urban and rural development in such areas as zoning, permitting, road construction, and the establishment of waste disposal sites.

Resource evaluation for this report is based on a number of sources including Florida Geological Survey reports and unpublished data, core and well cutting descriptions, geological logs, field reconnaissance, state and federal statistical data, company reports, questionnaires, and discussions with mining company personnel and state and federal officials. Although detailed information on company statistics is frequently confidential, information of a more general nature is readily available or can be reasonably extrapolated from existing data.

Two well location systems are used in this report. One uses the rectangular system of section, township, and range for identification. The well number consists of six parts: W for well, county abbreviations, the Township, Range, and Section, and the quarter/quarter location within the section. The other system uses the Florida Geological Survey sample repository accession number, such as W-4150.

Table 1. Metric Conversion Factors

For readers who prefer metric units to the U. S. units used in this report, the following onversion factors are provided.

MULTIPLY	BY	TO OBTAIN
feet	0.3048	meters
miles	1.609	kilometers
acres	0.4046	hectares
short tons	0.9072	metric tons

GEOMORPHOLOGY

Escambia County is located in the extreme western portion of the Florida panhandle, within White's (1970) Northern (Proximal) Zone. This zone, which traverses northern Florida, is characterized by broad uplands which extend from the northern peninsula, westward into the Western Highlands of the panhandle. Within this zone are a number of geomorphic subdivisions. Those

subdivisions present within the county include: the Western Highlands, the Gulf Coastal Lowlands and the Escambia Valley (Figure 1).

The Western Highlands occupy the northern portions of the county. In this region, stream erosion has played a key role in shaping the distinctive topography. Today, the ridges and rolling hills of the Western Highlands, which include numerous small lakes, ponds, and streams, gently slope southward. Topographic highs in this area reach a maximum elevation of 286 feet above mean sea level (MSL) in Township 6N, Range 33W, section 32. The southern boundary of the Western Highlands is approximated by the 120 feet MSL elevation contour (White, in Puri and Vernon, 1964). White notes, however, that in some locations this boundary is apparent only as a gradual reduction of elevation and a flattening of terrain as lower elevations are reached. The Western Highlands extend to Alabama on the west and north, to the Escambia Valley on the east, and to the Gulf Coastal Lowlands in the south.

The Gulf Coastal Lowlands, which extend along the coastal portions of the Florida panhandle and the gulf coastal portion of the Florida peninsula, occupy the southern one-third of Escambia County. In Escambia County, the area is bounded to the east by Pensacola Bay and the Escambia River, the Perdido River to the west, and the Gulf of Mexico to the south. In this area the lowlands are typically underlain by medium- to coarse-grained sand and gravel, and minor amounts of silt and clay.

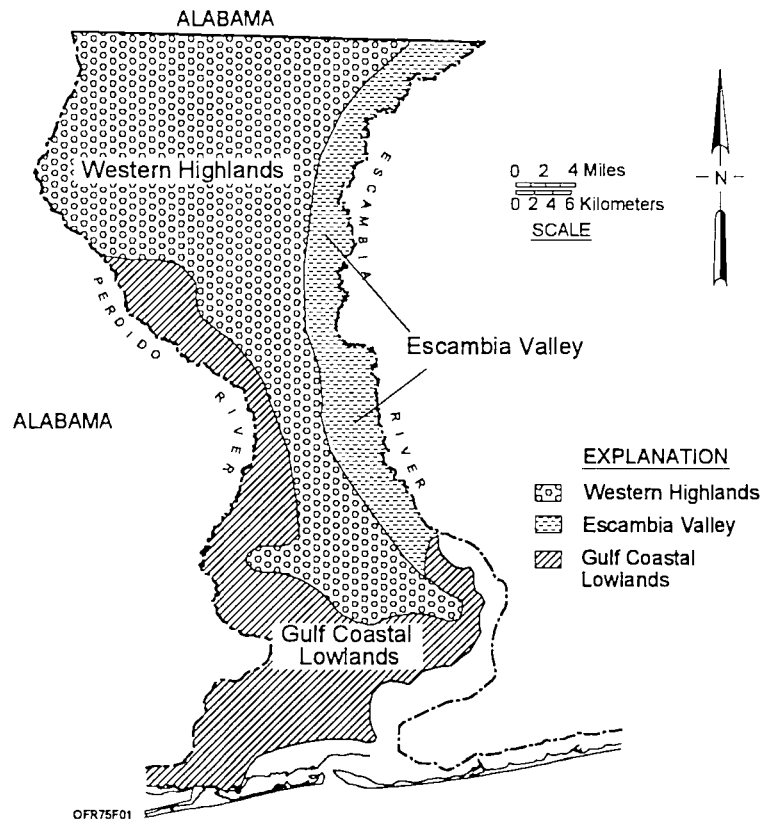


Figure 1 – Geomorphology of Escambia County, Florida (Modified from Puri and Vernon, 1964)

Most of the Gulf Coastal Lowlands have elevations at or below 75 feet above MSL. Exceptions occur in the northwestern portion of the Pensacola area where several localities have elevations in excess of 120 feet above MSL. Although most of the lowlands have low topographic relief, several localities in the Pensacola area have steep slopes. Prominent among these are linear erosional features including Bayou Texar and its tributary, Carpenter Creek, as well as the near-vertical slopes at Magnolia Bluff, and Red Bluff (Figure 7).

Escambia Valley, which extends from southern Alabama southward to Escambia Bay, occupies the eastern part of the study area. Here, land surface elevations range from sea level to 25 feet above MSL. The topography slopes gently eastward towards the Escambia River. This area, which represents the flood plain of the Escambia River, is underlain by clayey sand. The flood plain and its nearly impermeable sandy clay causes perennially wet conditions.

TERRACES

A number of ancient marine terraces are present in the study area. These terraces are generally considered depositional features formed during higher stands of sea level. Healy (1975) recognized eight marine terraces in this area based on elevation (Figure 2). From highest to lowest, these include the Hazlehurst Terrace (215 to 320 feet above MSL), the Coharie Terrace (170 to 215 feet above MSL), the Sunderland/Okefenokee Terrace (from 100 to 170 feet above MSL; Cooke, 1939/ MacNeil, 1950), the Wicomico Terrace (from 70 to 100 feet above MSL), the Penholoway Terrace (42 to 70 feet above MSL), the Talbot Terrace (from 25 to 42 feet above MSL), the Pamlico Terrace (from about 10 to 25 feet above MSL), and the Silver Bluff Terrace (less than 10 feet above MSL).

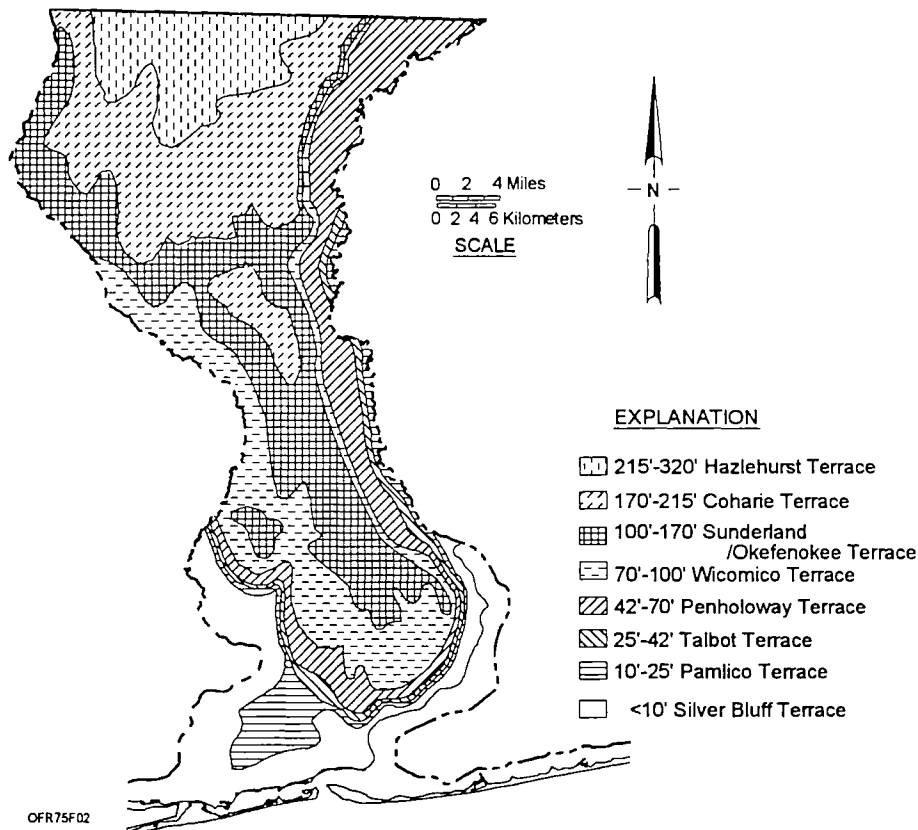


Figure 2 - Terraces and shorelines of Escambia County, Florida (modified from Healy, 1975)

In Escambia County, these terraces occur as a series of very subtle step-like features trending north to south, with the higher elevations to the north and lower elevations towards the south. The Hazlehurst Terrace coincides with the highest elevation of the county. Figure 2 shows the approximate location and areal extent of these terraces.

GEOLOGY

Located in the extreme western portion of the Florida panhandle, Escambia County is characterized by surface and near-surface siliciclastics (clays, silts, sands and gravel) overlying thick

sequences of Cenozoic and Mesozoic carbonates (limestone and dolomite) and siliciclastics. In general, the sediments underlying Escambia County dip to the southwest resulting in individual stratigraphic units occurring at deeper depths to the southwest.

To date, the deepest penetration of subsurface sediments in Escambia County occurs in an oil test well drilled by Arco Oil and Gas Company at a site located in the north-central portion of the county (W-15013, Township 3N, Range 33W, section 2). Here, rocks consisting of Upper Jurassic quartzitic sandstone (Norphlet Sandstone) are present at a depth of 17,950 feet below land surface (BLS) (FGS well files). These rocks are overlain by thousands of feet of Mesozoic and Cenozoic carbonates and siliciclastics. The surface and near-surface sediments consist of sands, clays, and coarse siliciclastics ranging in age from Miocene to Holocene. Figure 3 is a location map for the geologic cross sections. These cross sections depict the occurrence of Eocene and younger carbonates and siliciclastics in Escambia County.

The sand and gravel lithologies of the near-surface sediments associated with Pleistocene terrace deposits and the Citronelle Formation as shown in Figures 4 and 5, stand in contrast to surface lithologies present in the eastern panhandle region of Florida. There, to the east of the Choctawhatchee River, the Ocala Limestone crops out. This limestone, which dips to the southwest, occurs at a depth of approximately 1,800 feet BLS in southern Escambia County (Figures 5 and 6).

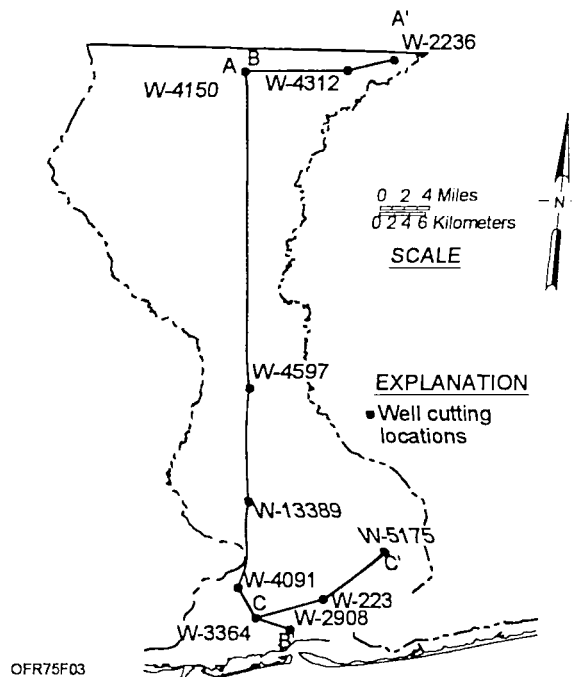


Figure 3 - Geologic Cross Section Location Map

In the study area, the lower Floridan aquifer system is wholly contained within the Ocala Limestone (Maddox et al., 1992). These sediments were deposited in a shallow marine environment approximately 40 to 38 million years ago during the Late Eocene epoch. The lithology of the Ocala Limestone is primarily a fossiliferous, grayish-cream to chalky white limestone with clay and glauconite as common minor constituents. Variable in thickness, the Ocala Limestone generally averages less than 175 feet within the county (Figure 4). To date, well W-2236 (Township 6N, Range 30W, section 35ca) has the thickest, most complete section of Ocala Limestone measuring 201 feet (Figure 4).

The Lower Oligocene Bucatunna Clay Member of the Byram Formation underlies all of the western Florida panhandle. This unit unconformably overlies the Ocala Limestone. MacNeil (1944) described the Bucatunna Clay at its type locality in Wayne County, Mississippi, as consisting of

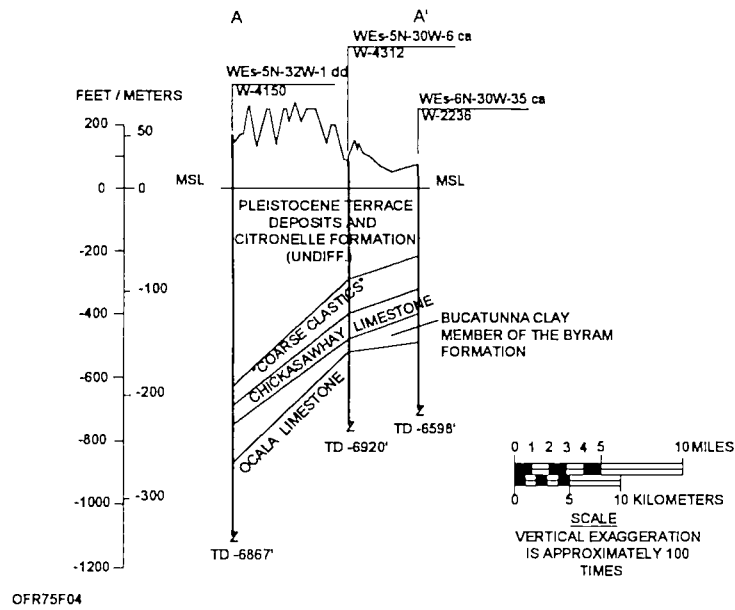


Figure 4 - Geologic Cross Section A-A' (West-East)

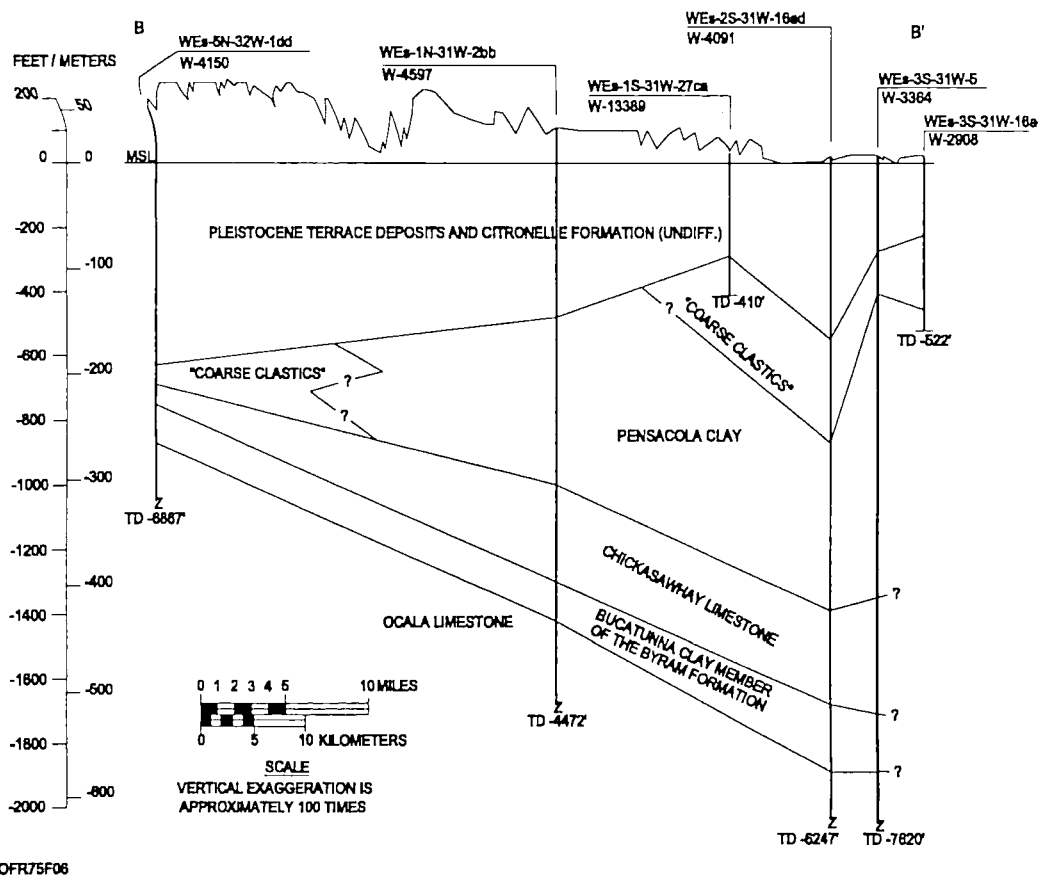


Figure 5 - Geologic Cross Section B-B' (North-South)

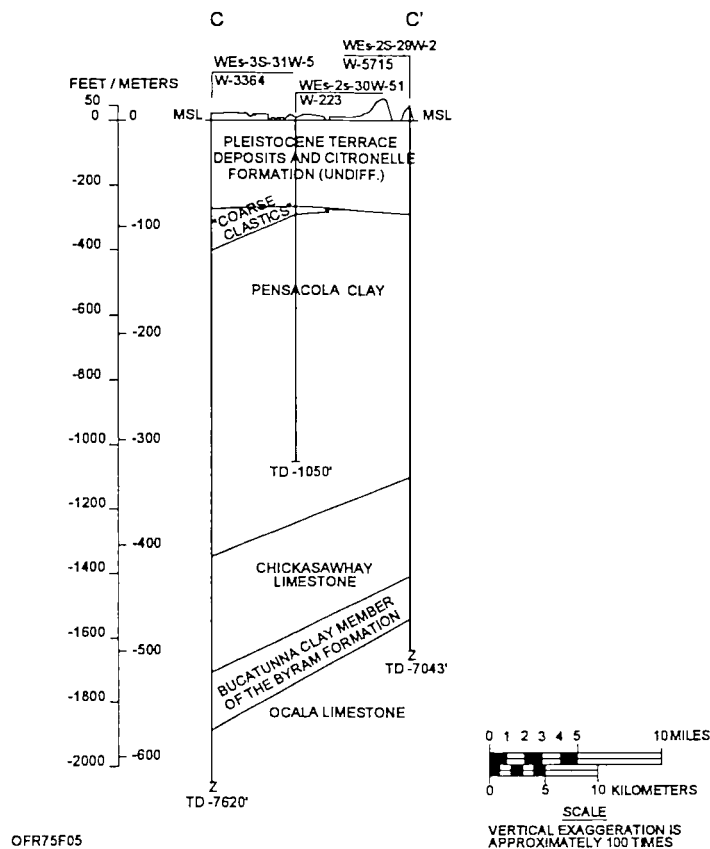


Figure 6 – Geologic Cross Section C-C' (West-East)

"fossiliferous, calcareous clay, dark lignitic clay, laminated fine sand and clay, laminated argillaceous fine sand with some beds of coarser sand, bentonite, and here and there a bed or streak of very fossiliferous marl at the top." In the study area, this clay unit follows the above description except for the presence of a thin bed of limestone near its base and the absence of bentonite and fossiliferous marl (Marsh, 1966). Florida Geological Survey well data show that the Bucatunna Clay has an average thickness of 125 feet and is present at depths ranging from 400 to 1,700 feet below MSL in the study area (Figures 4, 5 and 6).

The Bucatunna Clay is unconformably overlain by the Upper Oligocene Chickasawhay Limestone. This carbonate unit, which dips to the southwest in Escambia County, occurs at a depth of approximately 900 feet below MSL in the Pensacola area. Underlying all of Escambia and Santa Rosa Counties, the Chickasawhay Limestone thickens from approximately 50 feet in northern Escambia County to as much as 375 feet along the Gulf of Mexico coast (Figures 5 and 6). This formation is described by Marsh (1966) as a "gray to light-gray, hard, highly porous or vesicular limestone and dolomitic limestone."

The Chickasawhay Limestone is unconformably overlain by the Pensacola Clay, a fossiliferous, silty, micaceous, clay containing variable amounts of fine to coarse, quartz sand, and carbonized wood and plant remains. The Miocene age Pensacola Clay occurs in the southern two-thirds of the county. It occurs at depths ranging from about 575 feet below MSL at its northern limit (Figure 5) where it grades into the coarse siliciclastics, to approximately 400 feet below MSL near the coast. The Pensacola Clay attains a maximum thickness in the Pensacola area of more than 750 feet (W-223, Figure 6). From this area, it thins in all directions.

Overlying the Pensacola Clay, except in southeastern Escambia County where it is not present, is a siliciclastic deposit comprised of sand, gravel and clay referred to as "Coarse Clastics"

(Braunstein, et al., 1988). These sediments, which average approximately 200 feet in thickness within the study area, occur at a depth of approximately 300 feet below MSL, except in extreme north-central Escambia County, where they occur at a depth of 630 feet below MSL (Figures 4, 5 and 6). The abundance of fossils, primarily mollusks, within this unit distinguishes it from the overlying Citronelle Formation which is similar in lithology.

The Pliocene/Pleistocene Citronelle Formation is the oldest lithologic unit exposed in the study area. A 55-foot section of Citronelle is present in the southernmost point of Bay Bluff Park (Township 2S, Range 29W, section 2). Johnson (1989) gives a detailed description of this section. The lithology of this unit was described by Schmidt (1978) as consisting "...of quartz sands and gravels which are commonly well sorted... including lenses and beds of relatively pure clay and thin beds of limonite overlying a clay bed." Marsh (1966) noted the common presence of a limonite - cemented sandstone called "hardpan" throughout the unit. Sandy clay from this formation was mined near Molino in Escambia County during the 1960's for use in making bricks. Analyses of Citronelle sediments performed by Coe (1979) indicated that this formation was deposited in a moderate to high energy fluvial environment.

The Citronelle Formation is difficult to differentiate from the overlying Pleistocene terrace deposits because of the similarity of their respective sand and gravel lithologies. The combined thicknesses of the Citronelle Formation and Pleistocene terrace deposits average approximately 350 feet in the Pensacola area (Figure 6). Florida Geological Survey well data show that the Citronelle Formation thins towards the Gulf.

Undifferentiated Pleistocene-Holocene sediments form a veneer over much of Escambia County. Marine terraces were formed from these sediments during successive sea-level rises during the Pleistocene. Encroachments of the sea caused substantial mixing of Citronelle sediments which, in turn, resulted in a poorly defined contact between the Citronelle and the terrace deposits. In some locations such as rivers and stream valleys, these undifferentiated sediments are thicker due to reworking and subsequent fluvial deposition.

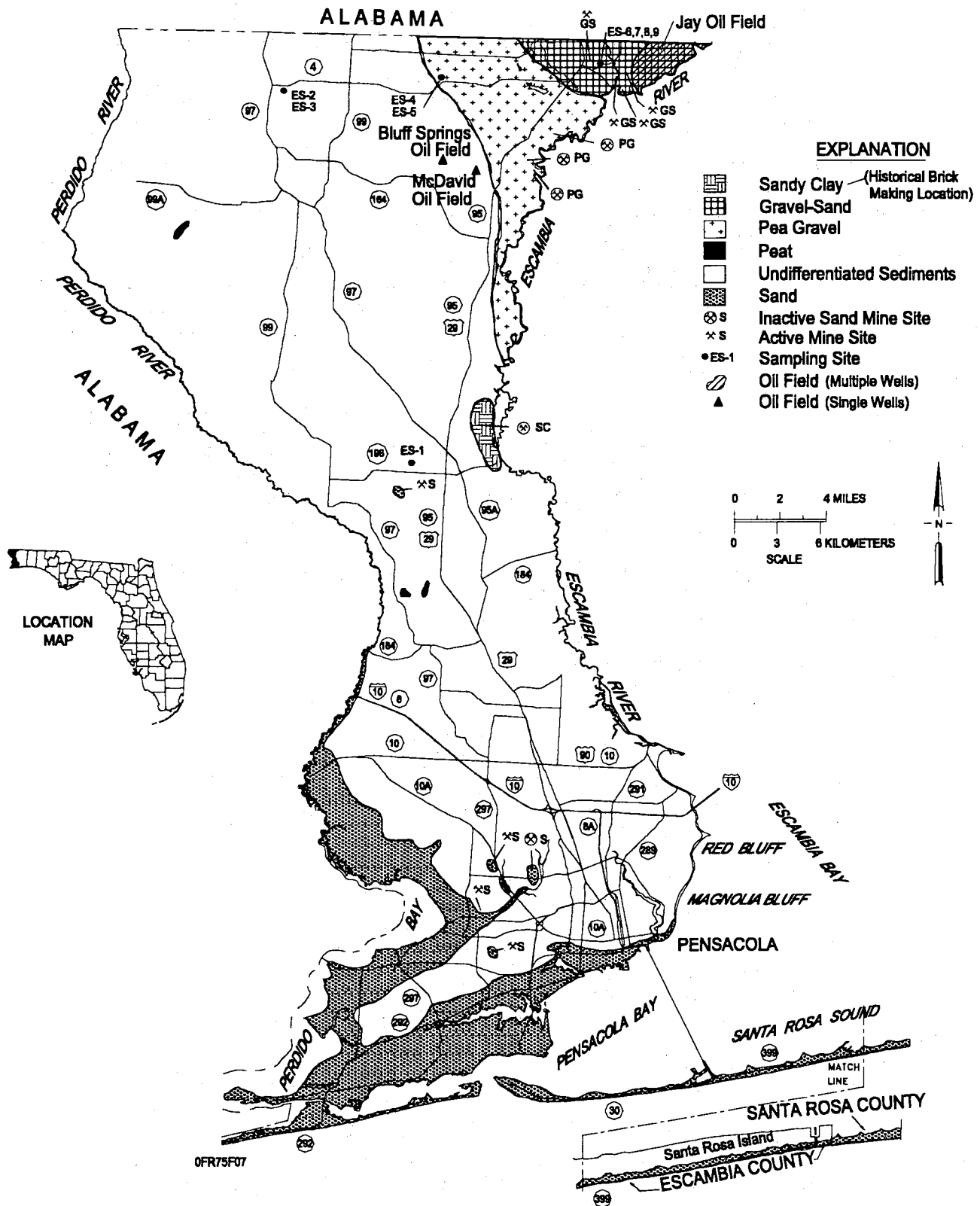
MINERAL RESOURCES

Introduction

The purpose of the following discussion is to provide information on the occurrence of economic mineral commodities in Escambia County. The information presented here is not intended to be an exhaustive investigation leading to immediate industrial development. Where the information is favorable, however, it may show that certain areas warrant further investigation. The Mineral Resources Map is designed to present a geographic overview of the major economic mineral commodities identified in Escambia County. Factors such as thickness of overburden, quality, and volume of the deposit could affect the mining of the mineral commodity at any specific site. Geologic cross sections were extrapolated from cores, well cuttings, and geophysical logs to show the distribution and thickness of Eocene and younger lithostratigraphic units (Figures 4 to 6). As a result, occasional variations between the geologic cross sections and the Mineral Resources Map (Figure 7) may occur. The principal industrial mineral commodities discussed here include sandy clay, sand and gravel, and peat. Also included is a short discussion of the oil and gas industry and its contribution to the economy of Escambia County.

Clay

Refractory clays were used in the manufacture of bricks and associated products since the 1700's. As the industry grew and prospered, it played a key role in the economic development of Escambia County. Records show that during the mid- to late-1700's, both Spanish and British kilns produced large quantities of brick from the thick sandy clays of the Citronelle Formation at various



locations throughout the county. The clay beds of the Citronelle Formation in the northern one-half of the county can be in the order of tens-of-feet in thickness and extend several miles in length (Musgrove, et al., 1961). The clays were utilized in the production of bricks through most of the 1800's. Competition from other brick making localities in adjoining states during the late 1800's and into the 1900's forced a decline in the industry. It was not until the 1970's that the last kiln, which was located near the community of Barth in east-central Escambia County, ceased operation. Today, these same clayey sediments that once contributed to a thriving industry, are used as road construction material and, locally, as fill. It should be noted that clay, similar to that which was mined in the past, is found throughout the sediments of the Citronelle Formation. At the scale depicted, however, local small resources cannot be shown. Site specific investigations may result in substantial economic clay resources being identified throughout the highlands.

Bell (1924) and Calver (1949) tested numerous clay samples from Escambia County. The results of these tests showed the clays to be suitable for the manufacture of several products including brick, tile, and pottery goods. Their findings can be found on Table 1.

Sand and Gravel

The red, clayey quartz sands and gravels exposed over much of Escambia County are from the Citronelle Formation. In contrast to these sediments are the buff-white quartz sands found in the southern portion of the county and along the barrier islands. The Citronelle sediments are of a coarser grain size and have a higher clay content than the fine-grained beach deposits.

The authors collected several grab samples from the Citronelle Formation at various locations in the county and analyzed them. Additionally, gravel samples from the Campbell Sand and Gravel Company in Century, Florida, were obtained for visual examination. The following data are from the binocular microscope examination of the various samples. Colors are referenced to the Munsell Color chart (Rock Color Chart Committee, 1984).

Sample ES-1, (Township 2N, Range 31W, section 5): clayey quartz sand, light brown color (5 YR 5/6), coarse grained, fine to granule size range, angular to subangular, low sphericity, 20 percent clay, trace heavy minerals, trace organics, iron staining.

Sample ES-2, (Township 5N, Range 32W, section 7): clayey quartz sand, grayish-orange (10 YR 7/4) coarse grained, medium to pea gravel (1 cm.) in size, angular to subangular, low to medium sphericity, 10 to 15 percent clay content, some small massive clay chunks, trace of heavy minerals, iron staining.

Sample ES-3, (Township 5N, Range 32W, section 7): clayey quartz sand, pale yellowish orange (10 YR 8/6) to light brown (5 YR 5/6), very fine sand, very fine to fine range, low to medium sphericity, angular to subrounded, clay content is 30 to 40 percent, trace heavy minerals, trace mica, iron staining.

Sample ES-4, (Township 5N, Range 31W, section 6): clayey quartz sand, grayish orange, (10 YR 7/4), medium grained, very fine to coarse range, angular to subangular, low to medium sphericity, clay content is 10 to 15 percent, trace heavies, iron staining. Limonite (hard pan) pale yellow orange (19 YR 8/6) to moderate brown (5 YR 4/4), one centimeter thick laminae, well indurated.

Sample ES-5, (Township 5N, Range 31W, section 6): quartz sand and gravel, (10 YR 7/4), the size of the large gravel is about 1 to 2 centimeters in diameter and as much as 3.5 centimeters in the elongated direction. The average pea gravel size is about 1 centimeter. All gravels are rounded and have medium sphericity. The quartz sand is medium grained, fine to coarse range, angular to subangular, low sphericity, trace heavy minerals, iron staining.

TABLE 2. Physical Properties and Firing Tests of Selected Clay Deposit Sites
(from Bell, 1924, and Calver, 1949)

Physical Properties													
Location	Gulf Pt.	Gulf Pt.	Gulf Pt.	Dexland	Dexland	Dexland	Dexland	Dexland	Muscogee	Schaffer	Quintette	Dexland	Molino
Sample No.	#0-49	#0-2	#0-31	#0-13a	#0-13b	#0-12	#0-73	#0-25	#0-4	#0-40	#0-68	#0-82	#0-1
Plasticity	Excel.	Excel.	Excel.	Excel.	Excel.	Excel.	Excel.	Excel.	Excel.	Excel.	Excel.	Excel.	Excel.
Water of Plasticity %	22.85	31.75	32.25	28.8	29.4	25.2	28.8	28.9	27.8	26.15	25	27.85	22.9
Linear Air Shrinkage %	7.3	8.3	9.7	11.8	10.6	8.5	10.4	10.8	8.4	8.3	11.4	10	7.3
Modulus of Rupture	246	181	252	657	475	208	384	1021	214	263	421	547	237
Slaking test	24 Hours	1 Hour	1 Hour	2 Days	20 Minutes	20 Minutes	10 Minutes	24 Hours	1 Hour	30 Minutes	10 Minutes	24 Hours	1 Hour
Firing Tests													
Degrees C	Linear Shrinkage %												
950 °C	6.7	0.8	1.8	1.1	0.5	1	0.1	0.8	0.9	0.8	0.4	0.2	0.3
1050 °C	7.3	0.8	2	1.9	0.6	1	1.1	2.2	0.1	1.7	0.6	1.5	0.3
1150 °C	7	5.7	4.3	4.4	6.4	1.5	2.6	2.2	5.1	1.7	1.1	2.5	0.3
1190 °C	7.2	6.7	5.3	4.4	8.4	1.5	5.8	3.2	5.1	2.7	1.8	5.0	0.3
1230 °C	7.1	6.7	7.8	5.4	6.4	1.5	5.8	3.2	5.6	2.2	1.8	5.0	0.7
1310 °C	7.4	6.7	11.3	5.4	6.4	1.5	6.6	3.2	5.6	4.2	2.6	5.0	0.7
1370 °C	8.2	6.7	NA	5.4	8.9	1.5	NA	4.2	6.1	4.7	2.6	5.0	0.7
1430 °C	8.2	8.2	NA	8.4	4.4	2.5	NA	7.7	4.8	6.7	3.1	7.5	1.7
Absorption %													
950 °C	18.58	27.87	21.2	14.95	18.8	18.7	24.3	18.22	19.75	18.23	12.88	18.43	17.31
1050 °C	17.9	20.79	20.1	14.3	18.4	17.95	17.2	18.56	18.32	19.9	12.14	18.75	17.13
1150 °C	12.38	10.45	11.4	9.3	12.25	17.5	9.86	12.8	9.25	19.45	8.88	13.80	16.18
1190 °C	12.25	5.2	65.8	7.83	4.15	13.8	6.24	7.82	9.42	11.3	8.13	10.45	13.51
1230 °C	12.54	5.8	4.32	6.8	2.58	11.58	6.16	7.95	8.5	10.1	8.22	11.07	13.36
1310 °C	9.41	4.82	3.29	5.35	1.22	10.58	4.08	6.84	5.3	7.72	5.03	7.68	12.89
1370 °C	6.49	1.92	NA	3.72	3.05	7.57	NA	4.72	0.49	5.39	4.62	5.74	12.47
1430 °C	2.85	1.38	NA	3.32	NA	8.3	NA	3.62	1.05	1.72	2.54	3.88	9.03
Porosity %													
950 °C	35.75	38.17	38.4	22.4	33.65	35.25	32.05	40.5	38.43	35.4	28.45	29.20	34.15
1050 °C	34.4	37.5	36.7	29.75	32.25	34.6	30.85	31.75	35.81	33.1	25.40	32.20	33.68
1150 °C	28	23.28	24.5	20.95	18	34.2	21.5	27.5	18.58	29.75	22.70	27.80	33.33
1190 °C	23.8	12.3	14.9	19.2	19.45	28.65	9.7	17.5	14.23	24.2	20.00	22.20	31.98
1230 °C	23	10.5	10.4	18.3	10.1	27.75	9.72	17.8	12.39	24.6	19.40	25.10	31.00
1310 °C	22.2	10.45	7.4	12.1	5.4	25.2	6.65	18.9	11.04	21.5	17.00	18.70	30.68
1370 °C	21.2	7.53	NA	11.7	5.25	25.9	NA	12.95	2.17	16.9	16.80	16.55	29.80
1430 °C	13	7.18	NA	10.8	6.75	20.4	NA	10.2	5.41	4.85	10.25	12.30	28.84
Color													
950 °C	Pink	Pink	Red-Pink	Pink	Pink	Cream	Cream	Cream	Pink	Pink	Cream	Pink	Lt. Red
1050 °C	Pink	Pink	Red-Pink	Pink	Cream	Cream	Cream	Cream	Pink	Cream	Cream	Gray	Lt. Red
1150 °C	Cream	Gray	Brown	Buff	Buff	Cream	Brown	Cream	Buff	Cream	Buff	Brown	Red
1190 °C	Cream	Gray	Brown	Buff	Buff	Cream	Brown	Gray	Buff	Cream	Buff	Brown	Red
1230 °C	Cream	Gray	Brown	Cream	Gray	Cream	Gray	Gray	Cream	Gray	Buff	Buff	Red
1310 °C	Gray	Gray	Brown	Cream	Gray	Cream	Gray	Gray	Cream	Gray	Gray	Buff	Red
1370 °C	Gray	Gray	NA	Gray	Gray	Brown	NA	Gray	Gray	Gray	Gray	buff	Red
1430 °C	Gray	Gray	NA	Gray	Gray	Brown	NA	Gray	Gray	Gray	Gray	Buff	Red

Sample ES-6, (Township 5N, Range 30W, section 4): dredge sample from the Campbell Sand and Gravel Co...quartz gravel, very pale orange (10 YR 8/6), to pale yellowish orange (10 YR 8/6), about 1.5 centimeters by 2 to 4 centimeters in elongated direction, rounded, medium sphericity, trace of heavy minerals, trace of clay.

Sample ES-7, (Township 5N, Range 30W, section 4): dredge sample from the Campbell Sand and Gravel Co...quartz pea gravel, very pale orange (10 YR 8/2) to pale yellow orange (10 YR 8/6), very coarse sand to pea gravel, rounded to subrounded, medium sphericity, trace heavy minerals.

Samples ES-8 and ES-9, (Township 5N, Range 30W, section 4): dredge samples, quartz gravel to cobble size, pale orange color (10 YR 8/2), mostly elongated quartz clasts, 3 centimeters by 7 centimeters, clay clasts.

The Clark Sand and Gravel Company, which is located in southern Pensacola, markets masonry sand as its primary product. Secondary products include an industrial sand blasting material and a fill material. Campbell Sand and Gravel Company, with land holdings in northeastern Escambia County, mines some of the largest diameter gravels in Florida. The gravels are used as aggregate in the manufacture of concrete and as a drain field material. The finer size fractions of quartz sand are used as masonry sand or fill material.

There are some smaller operations in Escambia County that produce a sand or clayey sand material. These include American Clay and Shell Co., Belview Pit (Township 1N, Range 39W, section 39), Gulfcoast Paving and Grinding, Inc., Blacksmith Pit (Township 2N, Range 31W, section 7), and the Brent Pit (Township 1S, Range 30W, lot 44). The State of Florida, Dept. of Transportation maintains two pits: the Dean Pit (Township 2S, Range 31W, section 26) and the Milford Road Pit (Township 2S Range 31W, lot 37).

Typical methods for open pit mining include: overburden removal by pan scraper and bulldozer, followed by mining utilizing draglines and bulldozers. The transportation of the commodity to market is usually by truck. The Campbell Sand and Gravel Co. dredges to an approximate depth of 16 feet. The gravels pass through a set of screens where they are sized into their number 1 aggregate, pea gravel, and waste. The waste from this operation (the fine sands and clays) are then returned to the small closed lake from which they were obtained.

Peat

Peat is a product of partially decomposed organic materials which accumulate when the rate of deposition exceeds the rate of decomposition (Davis, 1946; Bond et al., 1986). This process of accumulation occurs in perennially wet areas where organisms which normally metabolize plant matter are inhibited from doing so.

The United States Department of Agriculture, Soil Conservation Service (1960) identified a few small areas of highly organic, peaty sediments in Escambia County. This soil, called Pamlico muck, varies in thickness from only a few inches to three feet, and is underlain by clayey sand. Pamlico muck is located along Brushy Creek in northwestern Escambia County (Township 4N, Range 33W, section 16), along Jacks Branch in central Escambia County (Township 2N, Range 31W, sections 31 and 32), and in south-central Escambia County along Turners Creek (Township 2S, Range 30W and 31W, sections 1 and 13). There is a high probability of other small deposits of peat existing in many of the drainage basins in the county.

Undifferentiated Resources

Much of Escambia County has surface and near-surface sediments made up of clayey sand, and a few areas of organic muck. Although the potential for large scale mining is minimal due to the discontinuous and heterogeneous nature of these sediments, they may be valuable locally as fill material.

Oil and Gas

There are three oil fields in Escambia County, Florida (Lloyd, 1991). Two of these fields, the Bluff Springs Field, discovered in 1984, and the McDavid Field, discovered in 1988, were abandoned in 1991. These were small, single-well fields producing oil and gas at depths greater than 15,000 feet BLS from the Lower Jurassic Smackover Formation. The Jay Field, which extends east into Santa Rosa County and north into Escambia County, Alabama, is the only active field in Escambia County today. This multi-well field produces oil and gas from the Smackover Formation.

The Louisiana Land and Exploration Co. began production in the Escambia County portion of the Jay Field in 1971. At that time the wells produced more than 1000 barrels of oil per day per well. Today, the Jay Field wells in Escambia County, produce an average of about 190 barrels of oil per day per well (Ed Garrett, Florida Geological Survey, personal communication, 1999). Once the crude is removed from the ground, it is either transported through the Exxon Pipeline to Mobile, Alabama, for refining, or through interstate pipelines to the midwest region of the United States for refining. The State and Escambia County receive revenues from the oil field in the form of sales taxes, severance taxes, and less directly, by various support services such as trucking.

A shallow wildcat well, Advent-Bell No. 2-2, (permit 1284) was drilled beginning on January 26, 1993. The well was drilled to a depth of 3,500 feet before it was plugged and abandoned on February 24, 1993. To date, no other wells have been permitted in Escambia County.

REFERENCES

- Bell, O. G., 1924, A preliminary report on the clays of Florida: Florida Geological Survey, Fifteenth Annual Report 1922-23, 266 p.
- Bond, P.A., Campbell, K.M., and Scott, T.M., 1986, An overview of peat in Florida and related issues, report to the Florida Legislature: Florida Geological Survey Special Publication No. 27, 151 p.
- Braunstein, J., Huddleston, P.F., and Beil, R., 1988, Gulf Coast Region, Correlation of Stratigraphic Units of North America (COSUNA) Project: American Association of Petroleum Geologists, Tulsa, OK.
- Calver, J. L., 1949, Florida kaolins and clays: Florida Geological Survey Information Circular No. 2, 59 p.
- Coe, C. J., 1979, Geology of the Plio-Pleistocene sediments in Escambia and Santa Rosa Counties, Florida: MS Thesis, Florida State University, 113 P.
- Cooke, C. W., 1939, Scenery in Florida as interpreted by a geologist: Florida Geological Survey Bulletin No. 17, 120 p.
- Davis, J.H., 1946, The peat deposits of Florida, their occurrence, development and uses: Florida Geological Survey Bulletin No. 30, 250 p.
- Healy, H. G., 1975, Terraces and shorelines of Florida: Florida Bureau of Geology Map Series No. 71, approximate scale: 30 miles to 1 inch.
- Johnson, R. A., 1989, Geologic descriptions of selected exposures in Florida: Florida Geological Survey Special Publication No. 30, 175 p.
- Lloyd, J.M., 1991, 1988 and 1989 Florida petroleum production and exploration: Florida Geological Survey Information Circular No. 107, Part I, p. 1-62.
- MacNeil, F.S., 1944, Oligocene stratigraphy of the southern United States: American Association of Petroleum Geologists Bulletin v. 28, No. 9, pp.1313-1354.
- _____, 1950, Pleistocene shorelines in Florida and Georgia: U.S. Geological Survey Professional Paper 221-F, pp. 95-107.
- Maddox, G.L., Lloyd, J.M., Scott, T.M., Upchurch, S.B., and Copeland, R. (editors), 1992, Florida's ground water quality monitoring program - background hydrogeochemistry: Florida Geological Survey Special Publication No. 34, 364 p.
- Marsh, Owen T., 1966, Geology of Escambia and Santa Rosa Counties, western Florida Panhandle: Florida Geological Survey Bulletin No. 46, 140 p.
- Musgrove, R.H., Barraclough, J.T., Marsh, O.T., 1961, Interim Report on the Water Resources of Escambia and Santa Rosa Counties, Florida: Florida Geological Survey Information Circular No. 30, 89 p.
- Puri, H. S., and Vernon, R. O., 1964, Summary of the geology of Florida and a guidebook to the classic exposures (revised): Florida Geological Survey Special Publication No. 5, 312 p.
- Rock Color Chart Committee, 1984, Rock Color Chart: Boulder Colorado, Geological Society of America.

Schmidt, W., 1978, Environmental geology series - Pensacola Sheet: Florida Bureau of Geology Map Series No. 78, scale: 1" = 250,000'.

United States Department of Agriculture, Soil Conservation Service, 1960, Soil survey report for Escambia County, Florida: U.S. Department of Agriculture Soil Conservation Service in cooperation with the University of Florida, Institute of Food and Agricultural Services, 101 p.

White, W. A., 1970, The geomorphology of the Florida peninsula: Florida Bureau of Geology Bulletin No. 51, 164 p.

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