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FINAL REPORT

PROJECT NO. A-436-2

PRELIMINARY RECONNAISSANCE
OF THE
GEOLOGY AND MINERAL RESOURCES
OF HANCOCK COUNTY, GEORGIA

Prepared for
HANCOCK COUNTY, GEORGIA

By
CHARLES W. FORTSON, JR.

JUNE 25, 1959



Engineering Experiment Station
Georgia Institute of Technology
Atlanta, Georgia

ENGINEERING EXPERIMENT STATION
of the
Georgia Institute of Technology

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FIGURE 1. Map	In pocket attached.

FOREWORD

The road reconnaissance reported in the pages which follow grew out of the interest which the Macon Area Development Commission expressed some months ago in encouraging counties in its trade area to work with the Commission toward the assessment of the area's industrial and economic resources. The work was designed to give Hancock County, for the least possible cost, an appraisal of the possible need and desirability of carrying out a more comprehensive analysis of the County's mineral resources.

Initiated in conjunction with the Industrial Development Branch's long-range project for the Macon Area Development Commission, the technical work involved was actually done by staff members of the Mineral Engineering Group of the Engineering Experiment Station's Material Sciences Division.

As noted in the report, it is recommended that the County Commissioners use the findings in an effort to generate interest on the part of private firms to undertake the additional work necessary to fully appraise deposits considered worth further exploration. The cost of the additional research required is such that it is not recommended that the County consider undertaking the work itself.

Inquiries concerning the study's findings will be welcomed.

I. SUMMARY & RECOMMENDATIONS

At the request and under the sponsorship of Hancock County Commissioner(s) a preliminary investigation of the mineral resources of the county was made by road reconnaissance on June 23-25, 1959, to supplement available published information. The objectives of the investigation were to obtain and correlate sufficient data for a preliminary assessment of Hancock County's mineral resources, and to determine the desirability of additional work for a more complete evaluation of specific resources.

A summary of mineral commodities and recommendations is presented in Table I on pages 7 and 8.

Most of the county is underlain by crystalline rocks. Gravels, sands, and clays occur in certain southern portions (Figure 1). Present mineral operations include kaolin mining at Carrs Station and crushed granite activities at Granite Hill. Potential resources are additional kaolin deposits, brick clay, possible bloating materials, crushed and building stone, and sand and gravel. Further investigations concerning these materials are considered warranted. Commercial deposits of other minerals such as talc, asbestos, and pyrophyllite may be associated with other geologic conditions found in the county. However, extensive field and laboratory work would be required to determine the extent and quality of these minerals.

It is doubtful if the cost of fully exploring such areas can be justified at this time on the basis of anticipated return of capital.

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The expenditure of additional public funds by the Commissioners is not recommended for the further development of the mineral resources of Hancock County. This report should offer sufficient information to encourage exploration within the county by private enterprise. It is suggested that more detailed work would be the responsibility of those interested individuals, parties, or companies who stand to gain from the results obtained.

II. MINERAL RESOURCES

The mineral resources encountered in the county are described and recommendations made as follows:

A. Kaolin

Kaolin is mined by the Atlantic Refractories Company at Carrs Station. In prospect pits in the vicinity, the most notable of which is the Hutchings Mine about two miles north, kaolin occurs as variable-sized lenses at or near the top of the undifferentiated Cretaceous. Other kaolin prospect openings have been described by Smith (7) and Munyan (6).

Core drilling of the kaolin outcrops shown on the map (Figure 1), is recommended to determine the quantity of the deposits and the amount of overburden. The holes should be placed about 50 feet apart and arranged in a grid pattern. Their number and depth will depend on the thickness and lateral extent of the kaolin bodies. Drilling costs run about \$2.50/foot drilled, plus charges for moving on and off the property. Quantitative chemical analyses and ceramic tests of representative samples would determine the quality and utility of the material. There should be a sufficient number of these analyses and tests conducted to confirm the uniformity of the deposits.

B. Brick Clay

The southern part of the county, the vicinity of Linton for example, appears to contain deeply weathered argillite overlain by

only a few feet of soil (Figure 1). Weathered argillite is used in the Carolinas as a material for brick clay, and the deposits in Hancock County may be suitable for use in brick, conduit, tile and similar clay products. It is recommended that a more detailed search for weathered material be conducted on foot, followed by core drilling and ceramic tests, to determine the quantity, quality, and economic possibilities.

C. Bloating Material

It is thought that certain partially weathered zones of the feldspathic-phyllite unit might make suitable expandable material for such uses as light-weight aggregate and high-temperature insulation. The area northwest of Georgia Highway 22 and north of Granite Hill (Figure 1) underlain by this unit is deeply weathered and would probably offer the best possibilities. It should be investigated more carefully and representative samples collected for bloating tests to determine if the product would meet commercial requirements. A few strategically placed core holes would verify the depth of weathering and define the quantity of material available.

D. Crushed and Building Stone

Granite is quarried for crushed stone by the Weston and Brooker Company at Granite Hill (Figure 1). Many other large outcrops of granite occur in the southeastern and northwestern parts of the county (Figure 1), where there is a tremendous quantity available.

If the market warranted, the rock could probably be used for structural dimension stone, but most of it appears unsuitable for outside ornaments or veneers because of biotite present.

Argillite, in most places highly weathered, occurs in fresh exposures in southern portions of the county and probably elsewhere along valleys (Figure 1). It is thought that some of the fresh, well-cleaved material might be used for building stone and/or flagstone, as is done in North Carolina.

E. Sand and Gravel

Sand occurs in most Eocene exposures (Figure 1). Although not of glass quality, it could be a suitable construction material, if cleaned and sized.

Gravel occurs in many Cretaceous outcrops (Figure 1). It is typically composed of rounded, quartz pebbles about one inch in maximum dimension, and mixed with clay and sand. It appears to be a good, cheap source of aggregate.

County-highway authorities and others interested in cheap aggregate and construction sand should be notified of current findings.

F. Mineralized Areas

At least one major body and probably several other smaller, altered, ultra-basic intrusions occur approximately 8 miles northwest of Sparta (Figure 1). Talc and asbestos are present in small quantities. It is possible that a notable amount of these minerals exists, but only detailed work can supply the information. At least two other mineralized areas occur (Figure 1), one located

several miles southwest and the other several miles north of Sparta. Scattered quartz, silicified and iron-stained float with occasionally radiating talc incrustations, all obscured by weathering, mark the areas. They appear not to be pegmatites. Each trends northeast, sub-parallel with local foliation for several hundred feet.

These areas would have to be examined in detail to determine if asbestos, talc, and pyrophyllite occur in commercial quantities. It is conjectural if the cost of such work would be justified by the results anticipated.

TABLE I

SUMMARY OF MINERAL RESOURCES AND RECOMMENDATIONS
FOR HANCOCK COUNTY, GEORGIA

Mineral	Present Stage of Development		Recommended Work*
	Exploration	Production	
Kaolin		Atlantic Refrac- tories at Carrs Station	Continued exploration by geologist Drilling of the 3 out- crops on map and addi- tional deposits where found Chemical analyses of sites
Brick clay (weather- ed argil- lite)	X		Continued exploration by a geologist Drilling of certain areas thought worthwhile Ceramic tests for brick, tile, etc.
Bloating Material (weathered phyllite)	X		Continued exploration by a geologist Drilling of certain areas thought worthwhile Ceramic tests for bloat- ing characteristics
Granite (crushed stone)		Weston & Booker at Granite Hill	No further work recommended at present.

TABLE I (Cont'd)

SUMMARY OF MINERAL RESOURCES AND RECOMMENDATIONS
FOR HANCOCK COUNTY, GEORGIA

Mineral	Present Stage of Development		Recommended Work*
	Exploration	Production	
Argillite (crushed & building stone)	X		Continued exploration by a geologist Drilling, grading, blasting of areas thought worthwhile
Sand and Gravel		By county authori- ties at scatter- ed borrow pits	Contact county authori- ties concerning the areas available as shown on map (Fig. 1).
Mineralized Zones	X		No further work recommend- ed at present due to risk of small return.

*Costs would depend on total area to be covered for contracting agency and the degree of detail desired. This could be arrived at by discussion with interested groups. Present options, ownerships, and leases were not determined and would also affect areas to be covered, hence costs.

III. GENERAL GEOLOGY

A knowledge of the general geology of an area provides the only clues for finding existing mineral deposits which are simply concentrations within certain rock units. For example, kaolin bodies were found to occur in the upper portions of the Cretaceous. If a more detailed search for kaolin deposits is indicated, it would logically be restricted to the area underlain by argillite.

In like manner the area underlain by phyllite is thought to be the best area to search for bloating material. Stone for crushed and building purposes could be looked for in the areas underlain by granite. A knowledge of the trend of the rock units would enable one to restrict a search for mineralized areas along parallel zones or extensions of the trends. A brief explanation of the rock units distinguished (Figure 1) follows. All three major types of rocks occur in the county: sedimentary, metamorphic, and igneous.

A. Sedimentary Rocks

The sedimentary rocks, which occur in the southern part of the county (Figure 1), are separated into two units, based on lithology and stratigraphic position.

1. Undifferentiated Cretaceous

The undifferentiated Cretaceous is about 50 feet thick in this area and is the oldest of two sedimentary formations. It is composed primarily of coarse sands and gravels, with its upper members commonly containing clays, many of which are highly kaoli-

nitic. The commonly crossbedded sands are of various shades between yellow and white. The gravel is made up of rounded, quartz pebbles and is generally restricted to basal portions. The sands commonly grade downward into gravels and upward into clay-rich layers which are ferruginous, silty clays or true kaolin. Kaolin deposits usually occur as discontinuous lenses several feet in thickness and 50 or more feet in maximum lateral dimension. They are generally unconformably bedded upon underlying material and are most abundant in the upper levels.

2. Jackson Group.

The Cretaceous is overlain unconformably by what is here called Jackson (Eocene) (5). Only the Barnwell (lower Jackson) formation and underlying channel sands are present; the latter, here designated as Eocene, may be remnants of Paleocene sediments. The channel sands are about 20 feet thick, lens-like, crossbedded deposits which commonly occupy depressions in underlying Cretaceous or crystalline rocks. These sands and the Barnwell formation overlap Cretaceous and basement rocks toward the north (Figure 1). The Barnwell, in east-central Georgia, has been divided (5) into three members: the basal Twiggs clay; the middle Irwinton sand; and an upper surficial sand of questionable age but included with the other horizons for simplicity. The lower or Twiggs has been described (5) as a series of clayey, marly sands; the Irwinton, as gray and mottled clays and sands. Their combined thickness rarely exceeds 100 feet.

B. Metamorphic Rocks

The metamorphic rocks of the county may be divided into 4 units (Figure 1): bedded argillite; feldspathic phyllite; injected hornblende gneiss; and an injected complex of hornblende gneiss, quartzite, and phyllite. These rocks are thought to be part of the Little River Series of Crickmay (2). They trend, with local variations, to the northeast and dip to the southeast (Figure 1). Although structures are, for the most part obscured by weathering, these rocks are thought to be locally contorted and isoclinally folded. The axial surfaces of minor folds dip to the southeast.

1. Argillite

Bedded argillite occur in the south-central portion of the county (Figure 1). They are similar to those of the Little River Series and the Carolina Slate Belt to the northeast.

The rocks are fine-grained and locally cleaved, but are of lower metamorphic grade than slate. Joints occur at a high angle to cleavage. Their colors range between grey, blue-green and black, usually occurring in layers of varying widths from a few inches to several feet, reflecting variations in composition. No consistent sequence of layers was seen. Bedding is locally conspicuous as thin bands of varying proportions of dark-and-light-colored grains, the sizes of which lie within the clay-silt range. In such places, graded bedding may commonly be seen, but crossbedding was not observed. Many of the tiny, dark grains are thought to be remnants of pyroclastic material, which was mixed with land waste before being deposited in rather quiet water. Other local sericite-chlorite

phyllite zones are thought to have been tuffs of basic or intermediate composition.

Also included in this unit are occasional thin, discontinuous lenses of what appear megascopically to be andesitic flows. They are hard, very fine-grained, rather massive, light-grey or blue rocks, lacking prominent cleavage. Their extent was not determined. Fresh exposures may be seen near where Buffalo Creek crosses the southern boundary of the county (Figure 1).

2. Feldspathic Phyllite

A light-colored, feldspathic phyllite occurs as a north-east-trending belt across the middle of the county (Figure 1). It appears to be of higher metamorphic rank than the argillite, being similar except for a high proportion of silt-sized feldspar and strips of chlorite and sericite. The degree of foliation varies, but is generally greatest near contacts with granite. At some places, the rock is poorly foliated and resembles a feldspathic siltstone. Some of the more foliated areas may be shear zones.

3. Injected Hornblende Gneiss

The injected hornblende gneiss is a massive unit, in most places deeply weathered, as evidenced by dark, red-brown saprolite and soil. It occurs as a lens between argillite and phyllite (Figure 1). It is extensively injected with varied-sized bodies of non-porphyrific granite, the larger of which are shown in Figure 1.

The unit is a coarse-grained, dark-green gneiss containing numerous hornblende needles up to several inches in length in a

silt-sized, quartz-feldspar matrix.

4. Hornblende Gneiss-Quartzite-Phyllite

A contorted series of hornblende gneisses, quartzites, and phyllites, locally injected by granite and pegmatite, is mapped as a single complex unit. The layers vary in thickness between a few inches and a few feet, the gneiss generally being the thickest. The unit grades toward the east into feldspathic phyllite (Figure 1). The contorted, discontinuous, quartzitic layers are generally only a few inches thick. At least one shear zone occurs (Figure 1), trending subparallel with the foliation. Local displacement of quartzite into phyllite has been observed. There is also a thick, contorted, hornblende-gneiss horizon located within the middle portions of this unit. This hornblende gneiss is probably older and appears to be of higher metamorphic rank than the enclosing rocks. Its boundaries may be faulted. The unit might serve as a lithologic marker, if more detailed work was undertaken. It is also within this member that altered ultra-basic intrusive bodies occur (Figure 1).

C. Igneous Rocks

Both basic and acidic igneous rocks, including altered basic intrusives, diabase, and granite, occur in the county.

1. Ultra-basic Intrusions

An ultra-basic intrusive body, altered by regional metamorphism and hydrothermal activity (meta-pyroxenite ?), is found

about 8 miles northwest of Sparta (Figure 1). Float is scattered for several miles along the strike. The body is several hundred feet wide, some two miles long, and lies subparallel with the strike of the country rock, a contorted, hornblende gneiss. Hopkins (4) calls attention to other outcrops to the southwest for several miles. Although the original composition is unknown, olivine, pyroxene, and magnetite were present. As altered, it also contains amphibole, some of which is an asbestos variety, chlorite, and foliated talc. Secondary shearing is thought to have produced the chlorite and slip asbestos.

2. Granite


Both porphyritic and equigranular granites occur in the county. They are, however, so intermixed as to preclude separate mapping in the time allowed (Figure 1). A porphyritic variety is quarried at Granite Hill (Figure 1). There are several other old quarries nearby (9, 10). Most of the unit is a typical, quartz-biotite granite with potash-feldspar phenocrysts as large as an inch in maximum dimension. The porphyritic varieties commonly have less biotite. Equigranular granites are usually biotite-bearing and commonly occur along the margins of the contact zones, or are the smaller injected bodies. The average composition of the feldspar was not determined, but both potash and soda-lime varieties were seen. Detailed petrographic analyses have been made by Watson (8). The granites appear not to be foliated or sheared, but certain rather abrupt boundaries with illite and schist (Figure 1) suggest the possibility of shear-

ed or faulted contacts.

3. Diabase Dikes

Diabase dikes, of no commercial significance, doubtless occur in many places, but only non-mappable float was seen.

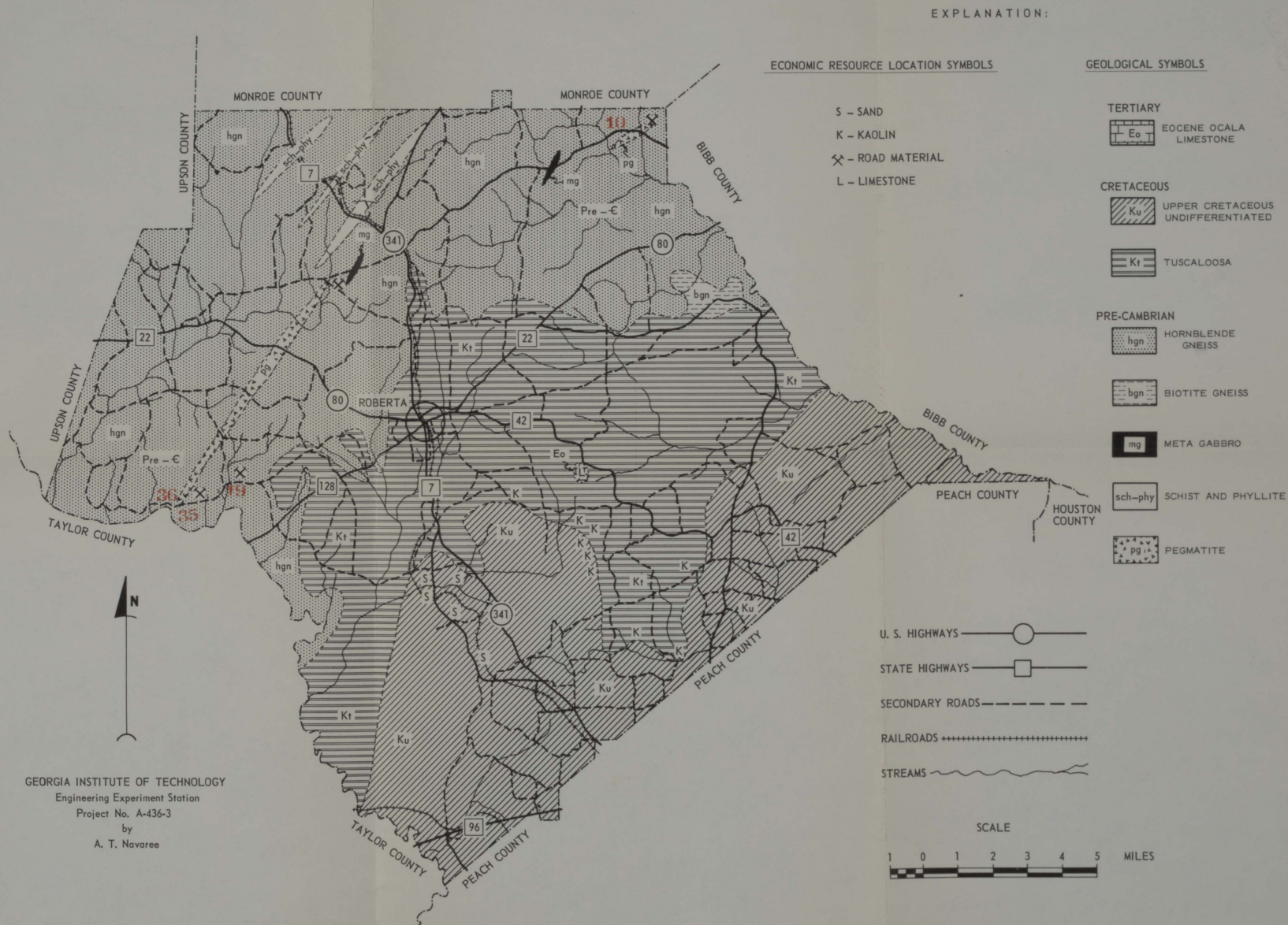
Respectfully submitted,


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CWF:er

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BASE MAP COMPILED FROM OFFICIAL COUNTY HIGHWAY
MAP, GEORGIA HIGHWAY DEPARTMENT

FIG 1: RECONNAISSANCE GEOLOGIC MAP OF CRAWFORD COUNTY, GEORGIA