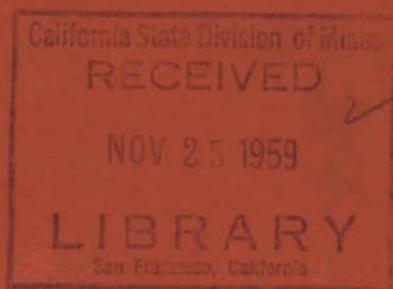


GEOLOGIC NOTES

**DIVISION OF GEOLOGY
STATE DEVELOPMENT BOARD
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RECONNAISSANCE GEOLOGY AND PRELIMINARY APPRAISAL OF
MINERAL RESOURCE POTENTIAL OF SUMTER COUNTY, S. C.

By

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DIVISION OF GEOLOGY
STATE DEVELOPMENT BOARD

ON JANUARY 20 AND 21, 1959, A BRIEF RECONNAISSANCE INVESTIGATION OF SUMTER COUNTY WAS UNDERTAKEN IN AN ATTEMPT TO MAKE A PRELIMINARY APPRAISAL OF THE MINERAL RESOURCE POTENTIAL OF THE COUNTY. FIGURE 1 SHOWS TENTATIVE OUTLINES OF THE PRINCIPAL PHYSIOGRAPHIC DIVISIONS OF THE COUNTY AND SERVES AS A BASIS FOR DISCUSSION OF ITS MINERAL RESOURCES. IN THE FOLLOWING PARAGRAPHS EACH PHYSIOGRAPHIC UNIT IS DISCUSSED WITH PARTICULAR REFERENCE TO THE MINERAL RESOURCES KNOWN OR THOUGHT LIKELY TO BE PRESENT THEREIN.

UNIT I

UNIT I IS THOUGHT TO BE UNDERLAIN PRIMARILY BY UNCONSOLIDATED SANDS AND CLAYS OF THE TUSCALOOSA FORMATION OF UPPER CRETACEOUS AGE. IN PLACES, ROUNDED QUARTZ GRAVEL MAY OCCUR IN APPRECIABLE AMOUNTS. BEDS OF NEARLY PURE KAOLIN MAY ALSO BE PRESENT, ALTHOUGH MOST KAOLIN IN THE TUSCALOOSA IN THIS AREA MAY BE EXPECTED TO BE SANDY AND IRON STAINED. HEAVY MINERALS SUCH AS ILMENITE, RUTILE, AND ZIRCON COMMONLY OCCUR IN MINOR AMOUNTS (USUALLY LESS THAN 1 PERCENT) IN THE SANDS AND GRAVELS OF THE TUSCALOOSA FORMATION. THEY COULD PROBABLY BE RECOVERED ECONOMICALLY ONLY AS A BY PRODUCT OF A SAND OR GRAVEL OPERATION.

UNIT II

UNIT II, THE TERTIARY UPLAND, IS UNDERLAIN BY SANDS, CLAYS, THIN BUHRSTONE LENSES, AND BEDS OF SILICEOUS CLAY SHALE OR "FULLERS EARTH", PRINCIPALLY OF EOCENE AGE BUT CONTAINING SOME BEDS OF UPPER CRETACEOUS AGE. AT THE SURFACE OVER MOST OF THE AREA IS A HOMOGENEOUS REDDISH COLORED SANDY CLAY UP TO 20 FEET THICK. THIS UNIT IS APPARENTLY A RESIDUUM DEVELOPED ON THE TERTIARY FORMATIONS. IT IS QUITE COHESIVE AND WELL COMPACTED AND WILL STAND IN NEAR VERTICAL CUTS WITH LITTLE TENDENCY TO SLUMP. THE PRINCIPAL MINERAL RESOURCES IN THE TERTIARY UPLAND ARE "FULLERS EARTH" AND SAND-CLAY.

A "FULLERS EARTH" BED THAT IS UP TO 12 FEET THICK IN PLACES UNDERLIES MOST OF THE TERTIARY UPLAND. THERE ARE LARGE AREAS WHERE THIS FLAT-LYING BED COULD BE MINED EASILY BY STRIPPING OFF A FEW FEET TO A FEW TENS OF FEET OF UNCONSOLIDATED OVERBURDEN. THE "FULLERS EARTH" HAS CONSIDERABLE POTENTIAL AS A DILUENT, INERT FILLER, BLEACHING CLAY, AND CERAMICS MATERIAL.

THE RED RESIDUAL SOIL OF THE TERTIARY UPLAND IS IN MANY PLACES NEARLY PERFECT SAND-CLAY FOR USE IN HIGHWAY CONSTRUCTION.

NEAR THE POINSETT STATE PARK, BUHRSTONE HAS BEEN QUARRIED ON A SMALL SCALE FOR USE IN CONSTRUCTION OF SOME OF THE PARK BUILDINGS. POSSIBLY MORE USE CAN BE MADE OF THIS LOCAL BUILDING STONE IN SUMTER COUNTY IN THE FUTURE.

UNIT III

UNIT III IS PREDOMINANTLY FLAT-LYING FARM LAND AND IS COMPOSED OF CLAYEY SANDS, SANDY CLAYS, SPARSE GRAVEL LENSES, AND LOCAL CLAY BEDS TO DEPTHS OF AT LEAST 20 FEET BELOW THE SURFACE. THESE SEDIMENTS ARE THOUGHT TO HAVE BEEN DEPOSITED IN A SHALLOW SEA DURING MIOCENE (?) TIME. ALONG THE EASTERN BOUNDARY OF UNIT III IT IS POSSIBLE THAT SANDS AND CLAYS OF UPPER CRETACEOUS AGE ARE PRESENT BUT ARE OBTURED BY THIN RESIDUAL SANDY SOILS. THESE BEDS HAVE BEEN LUMPED IN WITH THE YOUNGER DEPOSITS OF PROBABLE MIOCENE AGE. THE MINERAL RESOURCES OF UNIT III ARE ESSENTIALLY CONFINED TO BRICK CLAY, SILICA SAND, AND TO COMMON BORROW AND SAND-CLAY MIX FOR ROAD BUILDING.

ON THE NORTHEASTERN EDGE OF SUMTER, THE SUMTER BRICK WORKS WAS OPERATED FROM ABOUT THE TIME OF THE CIVIL WAR UNTIL 1941. THE MATERIAL USED WAS A SANDY CLAY WHICH IS PRESENT WITHIN 2 FEET OR SO OF THE SURFACE OVER A WIDE AREA NORTH AND EAST OF SUMTER. THIS CLAY PRESENTED SHRINK-AGE PROBLEMS DURING DRYING AND HAD TO BE FIRED AT TEMPERATURES FROM 2,000 TO 2,500° F. THE WIDE RANGE OF COLOR FROM SALMON TO PURPLE AND THE DISTINCTIVE APPEARANCE OF THIS BRICK MADE IT MUCH SOUGHT AFTER AS A FACE BRICK.

SUPERIMPOSED ON THE SURFACE OF UNIT III ARE COUNTLESS ELONGATE OVAL DEPRESSIONS KNOWN AS CAROLINA BAYS. WHERE WELL DEVELOPED, THE LARGER BAYS COMMONLY HAVE RIMS OF CLEAN WHITE SILICA SAND. THIS SAND IS SO CLEAN IN SOME PLACES AS TO BE SUITABLE FOR GLASS MAKING WITH NO PREPARATION OTHER THAN SIMPLE WASHING AND SCREENING. THE BEST OF THESE SAND DEPOSITS IN SUMTER COUNTY ARE ASSOCIATED WITH THE TWO LARGE BAYS KNOWN AS DIAL BAY AND WOODS MILLPOND, IN THE EASTERN PART OF THE COUNTY.

UNIT IV

UNIT IV OR THE SANDHILLS AREA IS PREDOMINANTLY COMPOSED OF LOW DUNE-LIKE DEPOSITS OF LIGHT YELLOWISH-BROWN TO CREAMY WHITE FINE-TO COARSE-GRAINED SAND. THIS UNIT WAS DEPOSITED DURING MIOCENE, PLIOCENE, OR POSSIBLY EARLIEST PLEISTOCENE TIME, PROBABLY ON THE MARGIN OF A SEA WHICH OCCUPIED THE EASTERN TWO THIRDS OF THE COUNTY AND IN WHICH THE CLAYEY SANDS AND SANDY CLAYS OF UNIT III WERE DEPOSITED.

THE MINERAL RESOURCES OF UNIT IV ARE ESSENTIALLY LIMITED TO THE EXTENSIVE DEPOSITS OF SILICA SAND (SEE FIG. 1). AFTER SIMPLE WASHING AND SCREENING, THIS SAND SHOULD BE SUITABLE FOR CONSTRUCTION SAND, BLAST SAND, ENGINE SAND, AND THE LIKE. GREATER CARE IN CLEANING AND SIZING THE SAND AND IN REMOVING IRON-BEARING HEAVY MINERALS WOULD PROBABLY ALLOW THE PREPARATION OF SPECIFICATION FOUNDRY SAND AND GLASS SAND.

UNIT V

UNIT V, CONSISTING PRINCIPALLY OF TERRACE DEPOSITS OF SAND, GRAVEL, AND CLAY, WAS DEPOSITED BY THE WATEREE RIVER DURING PLIOCENE OR PLEISTOCENE TIME. SAND AND GRAVEL ARE MINED EXTENSIVELY FROM THIS UNIT NEAR HAGOOD.

NEAR DIXIE CROSSING AT THE SOUTHERN END OF THIS AREA IS AN EXTENSIVE DEPOSIT OF RATHER PLASTIC CLAY THAT CAN BE USED TO MAKE BRICK, PIPE, AND TILE. SIMILAR CLAY DEPOSITS PROBABLY ARE PRESENT ELSEWHERE IN THIS UNIT.

HEAVY MINERALS, INCLUDING ILMENITE AND LESSER AMOUNTS OF RUTILE, ZIRCON, AND MONAZITE, ACCOMPANY THE SANDS AND GRAVELS BEING MINED NEAR HAGOOD. THOUGH THE HEAVIES ARE NOT PRESENT IN SUFFICIENT AMOUNT IN THESE DEPOSITS TO JUSTIFY MINING FOR THEM ALONE, THEY BECOME CONCENTRATED IN THE FINES DURING THE GRAVEL WASHING OPERATION AND COULD POSSIBLY BE RECOVERED ECONOMICALLY AS A BY PRODUCT.

UNIT VI

UNIT VI OR SWAMP AS OUTLINED ON FIG. 1 IS COEXTENSIVE WITH THE FLOODPLAIN OF THE WATEREE AND SANTEE RIVERS AND IS THE YOUNGEST PHYSIOGRAPHIC UNIT IN THE COUNTY. SANDS, GRAVELS, SILTS, AND CLAYS OF FLUVIAL ORIGIN ARE TO BE EXPECTED EVERYWHERE IN THIS AREA. NO MINERAL RESOURCES HAVE BEEN DEVELOPED TO DATE; BUT THERE IS SOME POTENTIAL FOR SAND AND GRAVEL FOR CONSTRUCTION PURPOSES AND FOR THE RECOVERY OF HEAVY MINERALS.

THE HEAVY MINERALS PRESENT IN THESE SEDIMENTS ARE PREDOMINANTLY ILMENITE, RUTILE, AND ZIRCON. MONAZITE MAY BE PRESENT IN TRACE AMOUNTS. NORMALLY THE SANDS CONTAIN LESS THAN 1 PERCENT HEAVIES BUT IN PLACES THEY MAY CONTAIN APPRECIABLY MORE. THE PRESENCE OF THE WATER TABLE AT OR WITHIN A FEW FEET OF THE SURFACE OF THE GROUND THROUGHOUT THIS AREA MAY HANDICAP EXPLORATION AND DEVELOPMENT.

SUMMARY

MINERAL RESOURCES THOUGHT TO HAVE ECONOMIC POTENTIAL IN SUMTER COUNTY ARE SAND, GRAVEL, SAND-CLAY, BUHRSTONE, "FULLERS EARTH", SILICA SAND, BRICK CLAY, HEAVY MINERALS

(INCLUDING ILMENITE, RUTILE, AND ZIRCON), AND KAOLIN. THESE MATERIALS HAVE BEEN DISCUSSED INDIVIDUALLY ABOVE IN THE SECTIONS DEALING WITH THE PHYSIOGRAPHIC UNIT IN WHICH THEY OCCUR. THE MATERIALS AND UNITS ARE:

SAND AND GRAVEL	-	UNITS V AND VI
SAND-CLAY	-	UNIT II
BUHRSTONE	-	UNIT II
"FULLERS EARTH"	-	UNIT II
SILICA SAND	-	UNITS III AND IV
BRICK CLAY	-	UNITS III AND V
HEAVY MINERALS	-	UNITS V AND VI
KAOLIN	-	UNIT I

OIL AND GAS HAVE NOT BEEN MENTIONED PREVIOUSLY BECAUSE THERE SEEMS TO BE LITTLE OR NO POTENTIAL FOR THESE COMMODITIES IN SUMTER COUNTY. THE SEDIMENTARY SECTION OVERLYING THE CRYSTALLINE BASEMENT ROCKS BENEATH SUMTER COUNTY IS ONLY ABOUT 700 FEET THICK. CONSIDERING THE ABSENCE OF OIL SOURCE-BEDS IN THE AREA, THIS IS NOT THICK ENOUGH TO ALLOW MUCH HOPE FOR COMMERCIAL AMOUNTS OF OIL OR GAS.

GROUND WATER IS AVAILABLE IN ABUNDANCE THROUGHOUT SUMTER COUNTY FROM WELLS UP TO 700 FEET DEEP. THESE WELLS TAP THE TUSCALOOSA FORMATION (UPPER CRETACEOUS), THE PRINCIPAL AQUIFER OF THE SOUTH CAROLINA COASTAL PLAIN. YIELDS OF SEVERAL HUNDRED GALLONS TO AS MUCH AS 2,000 GALLONS PER MINUTE FROM 8-10" WELLS ARE TO BE EXPECTED.

BACKGROUND AND HISTORY OF
"SOUTH CAROLINA GEOLOGICAL SURVEY"

By

H. S. JOHNSON, JR.

THE EARLIEST STATE-SPONSORED WORK OF A GEOLOGIC NATURE IN SOUTH CAROLINA WAS A ONE YEAR "GEOLOGICAL AND MINERALOGICAL SURVEY OF SOUTH CAROLINA" MADE IN 1825-26 BY LARDNER VANUXEM BY ORDER OF THE LEGISLATURE. VANUXEM APPARENTLY SPENT MUCH OF HIS TIME COLLECTING AND CATALOGGING SPECIMENS OF THE ROCKS AND MINERALS FOUND IN THE STATE. HEAVY EMPHASIS WAS PLACED ON THE PIEDMONT SECTION OF THE STATE TO THE PRACTICAL EXCLUSION OF THE COASTAL PLAIN AREAS, AND A COLLECTION OF OVER 500 SPECIMENS WAS MADE.

IN HIS REPORT TO THE LEGISLATURE, VANUXEM DISCUSSED THE LIMESTONES OF THE PIEDMONT, WHICH WERE AT THAT TIME BEING MINED AND BURNED IN MANY SMALL OPERATIONS TO MAKE LIME. HE ALSO REPORTED ON PYRITE (AS A SOURCE OF SULPHUR) AND GOLD IN WHAT WAS THEN CALLED THE SPARTANBURG AND ABBEVILLE DISTRICTS AND FURTHER MENTIONED THE POSSIBILITY OF USING MARL TO INCREASE PRODUCTION ON POOR SOILS AS HAD ALREADY BEEN DONE IN NEW JERSEY.

WITH THE SUBMISSION OF VANUXEM'S REPORT IN 1826, STATE-SPONSORED GEOLOGIC INVESTIGATIONS CEASED IN SOUTH CAROLINA UNTIL 1842, WHEN THE LEGISLATURE ORDERED AN "AGRICULTURAL SURVEY OF THE STATE" AND EDMUND RUFFIN, ESQUIRE, OF VIRGINIA, WAS APPOINTED "AGRICULTURAL SURVEYOR OF THE STATE" BY GOVERNOR HAMMOND. AFTER ONE YEAR, RUFFIN SUBMITTED A REPORT ON THE "COMMENCEMENT AND PROGRESS OF THE AGRICULTURAL SURVEY OF SOUTH CAROLINA" AND THEN RESIGNED. MUCH OF RUFFIN'S EFFORTS WERE CONCENTRATED ON GEOLOGIC INVESTIGATIONS OF THE MARLS OF THE COASTAL PLAIN AND ON EDUCATING FARMERS TO USE THE MARL ON POOR SOILS TO INCREASE AGRICULTURAL YIELDS.

WHEN RUFFIN RESIGNED IN 1843, MR. M. TUOMEY WAS COMMISSIONED BY GOVERNOR JAMES H. HAMMOND TO CONTINUE RUFFIN'S WORK AND TO MAKE A "GEOLOGICAL AND AGRICULTURAL SURVEY OF THE STATE." IN 1846 TUOMEY SUBMITTED A "REPORT ON THE GEOLOGY OF SOUTH CAROLINA." THIS REPORT, PUBLISHED IN 1848, PRESENTED THE RESULTS OF THE FIRST REAL STUDY OF THE GEOLOGY OF THE STATE.

APPARENTLY, FROM THE PUBLICATION OF TUOMEY'S REPORT UNTIL 1856 NO GEOLOGIC WORK WAS DONE IN SOUTH CAROLINA. IN 1856, HOWEVER, OSCAR M. LIEBER WAS APPOINTED "MINERALOGICAL, GEOLOGICAL, AND AGRICULTURAL SURVEYOR". HE PUBLISHED AN ANNUAL REPORT ON THE GEOLOGICAL SURVEY OF SOUTH CAROLINA IN 1856 AND FOR EACH OF THE THREE FOLLOWING YEARS. WITH THE EXCEPTION OF MINOR INVESTIGATIONS IN BEAUFORT AND COLLETON COUNTIES, LIEBER'S WORK WAS ALMOST EXCLUSIVELY IN THE PIEDMONT. HIS REPORTS ARE HIGHLY GEN-

ERALIZED AND CONTAIN LONG DISCOURSES ON TYPES AND ORIGIN OF ORE DEPOSITS IN THE LIGHT OF THE KNOWLEDGE OF HIS DAY.

LIEBER'S INVESTIGATIONS CEASED IN 1859 AND FROM THEN UNTIL 1904 NO GEOLOGIC INVESTIGATIONS WERE CARRIED ON IN SOUTH CAROLINA UNDER STATE SPONSORSHIP.

FROM 1904 UNTIL 1910, EARLE SLOAN SERVED AS STATE GEOLOGIST OF SOUTH CAROLINA. DURING THIS PERIOD FOUR OF SLOAN'S REPORTS WERE PUBLISHED BY THE STATE, THE MOST COMPLETE OF THESE BEING "CATALOGUE OF THE MINERAL LOCALITIES OF SOUTH CAROLINA", PUBLISHED IN 1908.

IN 1911, M. W. TWITCHELL SUCCEEDED EARLE SLOAN AS STATE GEOLOGIST AND HELD THIS POSITION FOR ONE YEAR. HE WAS ALSO HEAD OF THE DEPARTMENT OF GEOLOGY AT THE UNIVERSITY OF SOUTH CAROLINA DURING THIS PERIOD.

DR. STEPHEN TABER BECAME HEAD OF THE DEPARTMENT OF GEOLOGY AT THE UNIVERSITY OF SOUTH CAROLINA IN 1912 AND ALSO SERVED AS STATE GEOLOGIST. DR. TABER SERVED IN THIS CAPACITY UNTIL HIS RETIREMENT IN 1947.

DR. L. L. SMITH FOLLOWED TABER AS HEAD OF THE GEOLOGY DEPARTMENT AT THE UNIVERSITY AND ALSO ACTED AS STATE GEOLOGIST. FROM 1912 ON THERE WERE NO FUNDS APPROPRIATED FOR GEOLOGIC FIELD INVESTIGATIONS, AND THE STATE GEOLOGIST SERVED PRINCIPALLY IN AN ADVISORY CAPACITY ON A PART TIME BASIS.

WHEN THE STATE DEVELOPMENT BOARD BEGAN WORK IN 1945 IT SOON RECOGNIZED A NEED FOR GEOLOGIC INVESTIGATIONS, PARTICULARLY THOSE OF AN ECONOMIC NATURE, IN SOUTH CAROLINA. ARRANGEMENTS WERE MADE WITH DR. B. F. BUIE OF THE DEPARTMENT OF GEOLOGY, UNIVERSITY OF SOUTH CAROLINA, AND A SERIES OF SUMMER INVESTIGATIONS WERE BEGUN.

IN JUNE 1957 THE STATE DEVELOPMENT BOARD FORMED THE DIVISION OF GEOLOGY WITH A STAFF OF ONE FULL TIME GEOLOGIST AND ONE SECRETARY. IN AUGUST 1958 A SECOND FULL TIME STAFF GEOLOGIST WAS EMPLOYED. ADDITIONAL PART TIME GEOLOGICAL EMPLOYEES ARE USED FROM TIME TO TIME TO HELP CARRY OUT FIELD AND LABORATORY INVESTIGATIONS IN A CONTINUING PROGRAM OF STUDYING AND APPRAISING THE GEOLOGY AND MINERAL RESOURCES OF THE STATE.

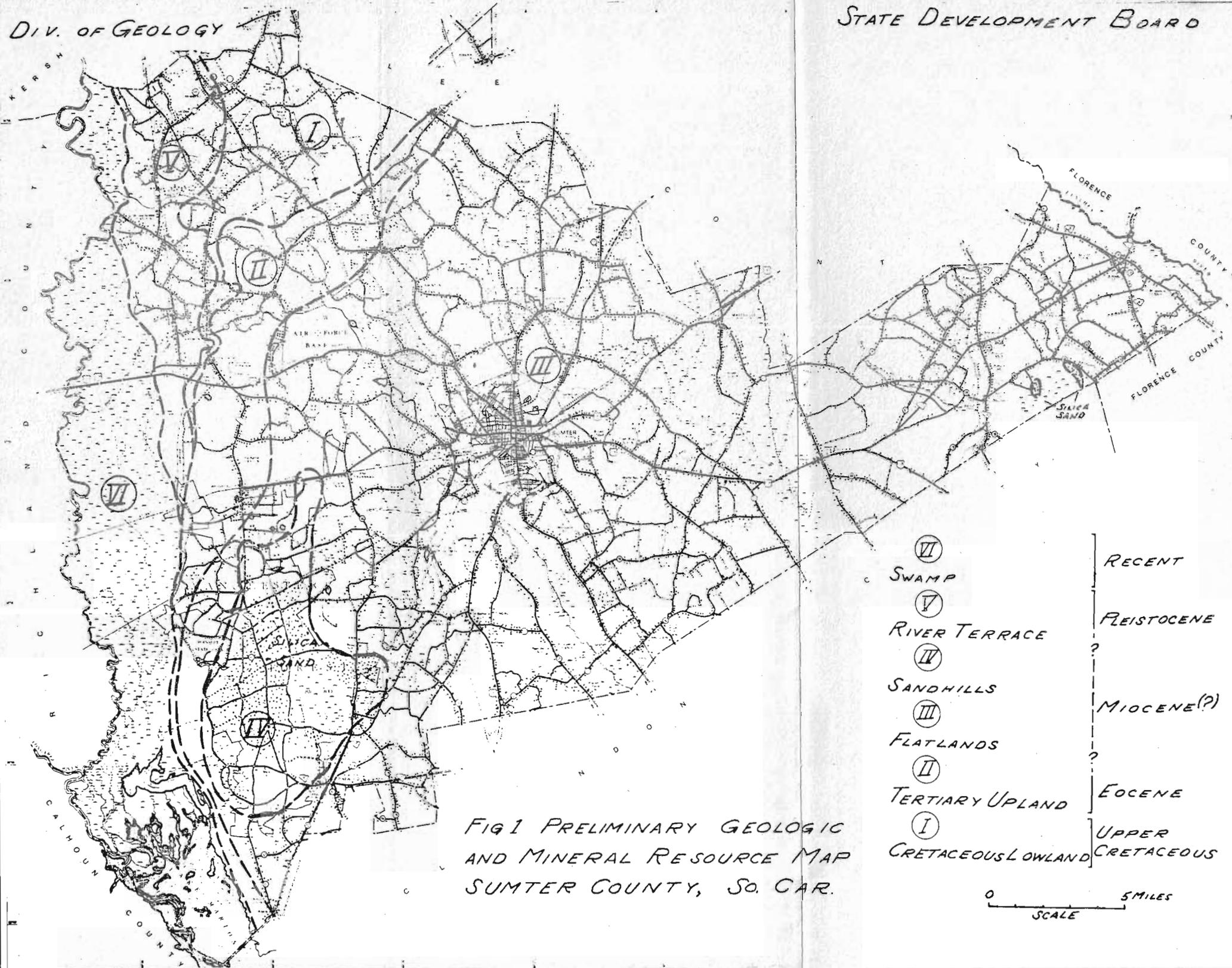


FIG 1 PRELIMINARY GEOLOGIC AND MINERAL RESOURCE MAP SUMTER COUNTY, SO. CAR.

