PURPOSE AND SCOPE

The increasing use of Interstate Highway 75 through the report area has generated the drilling of many wells to supply water for light industry, motels, and restaurants. Furthermore, a recent increase in ground-water use for supplementary irrigation has created a need for information on the required depths of wells, the amount of water to be expected, and the quality of the obtainable water. This atlas was prepared to make such information publicly available. The illustrations provide information on the geologic formations from which water is obtainable, their depth, and the probable quantity and quality of the water.

WELL-NUMBERING SYSTEM

The Statewide well-numbering system is based on a grid of 7½ - minute quadrangles numbered eastward and lettered northward with each well being given its own number in a quadrangle. The well numbers shown on the geohydrologic map are those (Georgia Geological Survey numbers) under which cuttings are on file in Atlanta at the Georgia Department of Mines, Mining and Geology and for which well schedules and lithologic logs have been made. The numbers used on the cross-section are the Georgia Geological Survey numbers appended to the quadrangle designations.

GEOLOGY

In much of the area, the surficial material to depths of from 30 to 50 feet is highly weathered. In this zone, limestones are completely leached and replaced in part by silica. This has caused the formation of chert boulders and tripoli, both of which are formed, especially along valley slopes, during lateral movement of ground water to streams. Because the weathered zone blankets most of the area, the geohydrologic map shows only the distribution of formations based on the uppermost occurrence of unweathered material in each set of well cuttings.

The geologic formations shown on the geohydrologic map and others in the subsurface are described in the table on sheet 2. Because those formations at depth are known chiefly from oil tests, relatively little is known of their hydrologic properties.

The principal water-bearing formations are the Clayton Limestone, the Tallahatta Formation, the Clinchfield Sand, and, in the southeast only, the Suwannee Limestone. The relations of these and their regional dips are shown on the geologic section.

HYDROLOGY

Until the 1950's, dug wells supplied much of the water needs in the area. When the 1954 drought caused many of these wells to go dry, they were replaced by wells drilled to deeper artesian formations, those in which the water levels rise above the level at which water is encountered. This trend has continued so that dug wells are now rare.

The Ocmulgee and Flint Rivers provide an alternative source of water, but they do not replenish the ground-water supply in the area. Instead, they pick up much additional flow from ground-water discharge from springs and from flowing wells in the major river valleys.

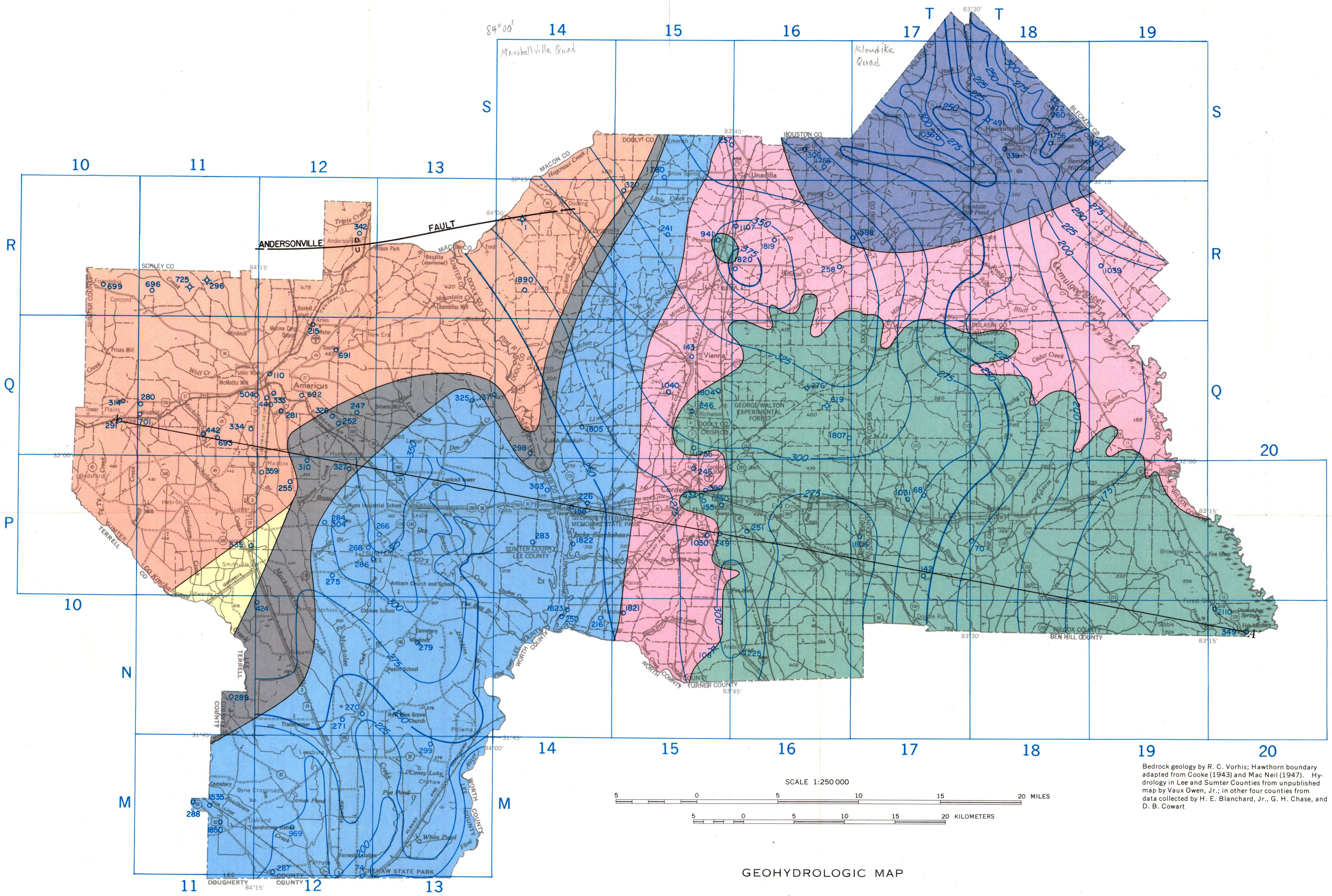
The average annual precipitation ranges from 44 inches in the southeast to 49 inches in the northwest, of which 12 to 16 inches leaves the area as runoff to the rivers. The bulk of the remainder evaporates or is transpired by plants, and only 2 or 3 inches, chiefly winter rain, penetrates the ground to recharge the water-bearing formations. Nevertheless, this recharge provides the ground-water resource of the 6-county area. If one assumes conservatively that 2 inches of rain penetrates to the water-bearing formations each year, the total water recharge per year for the 2,266 square-mile area is about 80 billion gallons. In order to use this annual recharge to the maximum, ideally spaced wells would have to be pumped continuously at a rate of 150,000 gallons per minute. A very rough estimate of water use suggests that less than 10 percent of this available resource is currently being used. Thus, in the foreseeable future, water quantity will not be a limiting factor in the economic growth of the six-county area.

A composite water-level surface is shown for much of the study area. The water levels of each of the major aquifers are so similar that they are not distinguishable for practical purposes. Leakage through confining beds tends to make a composite map representative of all the four mapped aquifers.

In using the composite water-level map, one should remember that water levels can be expected to fluctuate as much as 10 feet per year, with the highest level in midwinter and the lowest level in late fall. Furthermore, in choosing the level at which to set a pump in a well, one should allow not only for the lowest level that occurs annually, but a few feet more to allow for even lower levels in drought years plus an additional footage to allow for drawdown resulting from pumpage in the well and any possible water-level lowering that may be caused by nearby wells.

USE OF WATER-LEVEL CONTOURS FOR ESTIMATING STATIC WATER LEVELS IN WELLS

This water-level surface can be used to estimate the depth of water of a proposed well penetrating one or several of the aquifers. Wherever the land surface is higher than the water-level surface, a well can be drilled in which the depth to the static level will be equal to the difference, in feet, between the altitude of the land surface and the water-level surface. One can thus expect that a well drilled at a place crossed by a 200-foot water-level contour will have a static water level of 200 feet above sea level. If the altitude of the land surface at the well site is 300 feet, the depth to static level will be 100 feet. However, if land surface were below the 200-foot contour, as in the Flint or Ocmulgee River valleys, one can expect that a drilled well will flow.



EXPLANATION

Miocene
- Hawthorn Formation

Oligocene
- Suwannee Limestone
- Cooper Marl

Eocene
- Ocala Limestone
- Clinchfield Sand
- McBean Formation
- Tallahatta Formation

TERTIARY

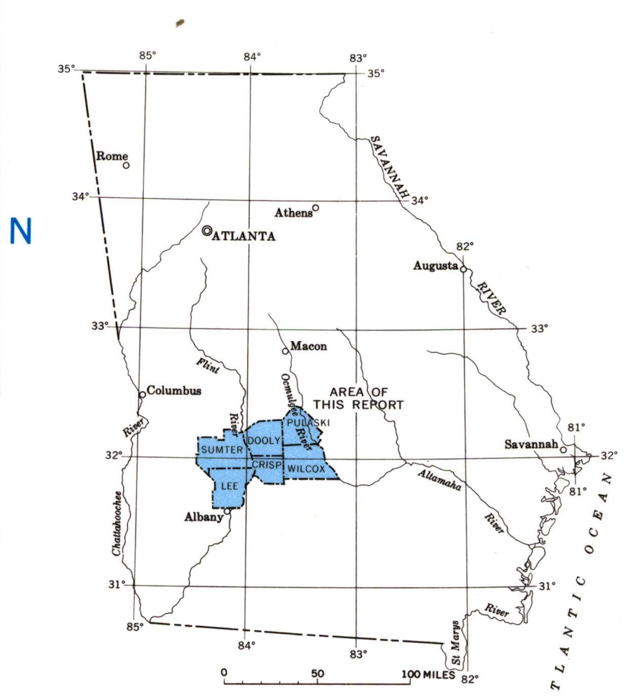
Contact, approximately located

D / U
Fault
Dashed where approximately located. U, *upthrown side;* D, *downthrown side*

275
250
Water-level contours
Shows altitude of water-level (potentiometric) surface, approximately located. Contour interval 25 feet; datum is mean sea level

o 258
Well and identification number

108
Oil-test well and identification number



INDEX MAP OF GEORGIA

Bedrock geology by R. C. Vorhis; Hawthorn boundary adapted from Cooke (1943) and Mac Neil (1947). Hydrology in Lee and Sumter Counties from unpublished map by Vaux Owen, Jr.; in other four counties from data collected by H. E. Blanchard, Jr., G. H. Chase, and D. B. Cowart

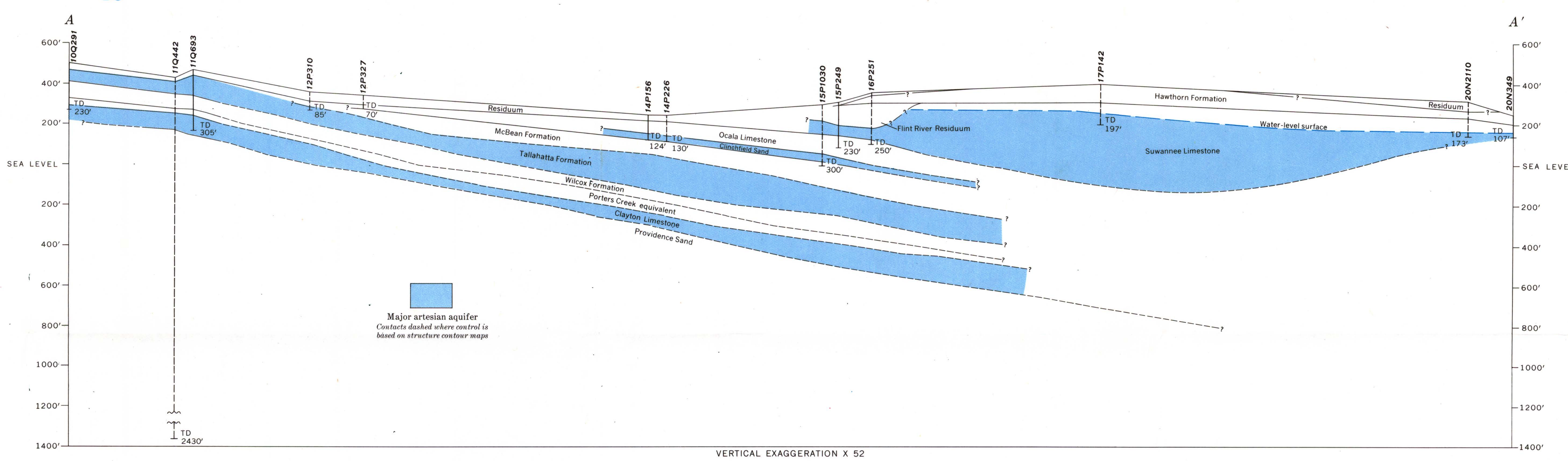
SCALE 1:250 000

5 0 5 10 15 20 MILES

5 0 5 10 15 20 KILOMETERS

GEOHYDROLOGIC MAP

Base from U.S. Geological Survey, Phenix City 1955-63, Macon 1953, Dothan 1953-65, Waycross 1953-66
Interstate 75 added to this Atlas



VERTICAL EXAGGERATION X 52

GEOLOGIC SECTION

INTERIOR—GEOLOGICAL SURVEY—WASHINGTON, D.C.—1972—W71076

GEOHYDROLOGY OF SUMTER, DOOLY, PULASKI, LEE, CRISP, AND WILCOX COUNTIES, GEORGIA

By
Robert C. Vorhis

1972

For sale by U.S. Geological Survey, price $1.00 per set