HYDROGEOLOGY OF THE
CLAYTON AND CLAIBORNE AQUIFER SYSTEMS

by
Anna F. Long

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ATLANTA
1989
INTRODUCTION

The purpose of this investigation is to update the Clayton and Claiborne aquifers in south Georgia. The information presented in this atlas provides a current perspective on the geology, hydrogeology, and aquifer characteristics of the area. The Clayton and Claiborne aquifers are the primary sources of water for domestic, agricultural, and industrial uses in the area.

INDEX MAPS AND TABLES

This section includes a series of index maps that show the location of the well field inventory network established for the aquifers. These maps are intended to assist in the interpretation of the stratigraphic column and the correlation of well data with the aquifer systems. The maps are based on 7.5 minute topographic maps, and the data are compiled from published and unpublished sources.

STRATIGRAPHIC COLUMN

The stratigraphic column is a generalized representation of the stratigraphic units present in the Clayton and Claiborne aquifers. The column is divided into several major units, each of which is described by its lithology and aquifer characteristics. The column provides a framework for understanding the geology of the area and the distribution of water-bearing formations.
The Clayton Aquifer, located in the southeastern part of Georgia, is a major source of groundwater for the area. The aquifer is composed of Paleocene-Eocene sedimentary rocks and is characterized by a cone of depression that extends from the outcrop area in coastal Georgia to the interior of the state. The cone of depression is evident in the potentiometric surface maps, which show the water levels in feet above mean sea level.

### 1981 Potentiometric Surface
Contour Interval 25 Feet

- **EXPLANATION**
  - Potentiometric surface contour in feet above mean sea level, dashed where approximate. Arrows indicate ground-water flow direction.
  - Outcrop area of Paleocene Undifferentiated Sediments.

### 1984 Potentiometric Surface
Contour Interval 50 Feet

- **EXPLANATION**
  - Potentiometric surface contour in feet above mean sea level, dashed where approximate. Arrows indicate ground-water flow direction.
  - Outcrop area of Paleocene Undifferentiated Sediments.

### 1986 Potentiometric Surface
Contour Interval 25 Feet

- **EXPLANATION**
  - Potentiometric surface contour in feet above mean sea level, dashed where approximate. Arrows indicate ground-water flow direction.
  - Outcrop area of Paleocene Undifferentiated Sediments.

### Hydrogeology and Compilation
By Anna F. Lang
1989

The water levels in the Clayton Aquifer are influenced by several factors, including evapotranspiration, precipitation, and local pumping. The aquifer is recharged primarily from the Chattahoochee River and the agricultural areas in Dougherty, Terrell, and asian Counties. The aquifer discharges to streams in the area and is used for various purposes, including irrigation, domestic, and industrial uses.

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POTENTIOMETRIC SURFACE TRENDS - CLAIBORNE AQUIFER

1981 Potentiometric Surface
Contour Interval 50 Feet

1984 Potentiometric Surface
Contour Interval 50 Feet

CONTINUOUS SURFACE TRAJECTORY

1986 Potentiometric Surface
Contour Interval 50 Feet

EXPLANATION

Legend:
- Outcrop area of Claiborne Undifferentiated Sediments, Tallahassee Formation and Lisbon Formation.
- Well location.

- Potentiometric surface contour in feet above mean sea level. Dashed where approximated. Arrows indicate ground-water flow direction.

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Geothermal and Streamflow
100 -

We refer to the Claiborne aquifer recharge area as "High Recharge," as the main recharge mechanism to the Claiborne aquifer is ground-water drainage from the nearby outcrop area. In this area, the water level is below sea level, and there is no artificial pumping or withdrawals. The water level in the Claiborne aquifer is lower than in the adjoining areas, where the water level is below sea level but is being extracted for human consumption.

The Claiborne aquifer recharge area has a lower water level than the adjoining areas, where the water level is below sea level but is being extracted for human consumption. This indicates that the Claiborne aquifer is not being recharged by ground-water drainage from the outcrop area. The water level in the Claiborne aquifer is lower than in the adjoining areas, where the water level is below sea level but is being extracted for human consumption.

The Claiborne aquifer recharge area is shown in the map as a dark-colored area. The water level in the Claiborne aquifer is lower than in the adjoining areas, where the water level is below sea level but is being extracted for human consumption. This indicates that the Claiborne aquifer is not being recharged by ground-water drainage from the outcrop area.

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The Clayton and Claiborne aquifers are major sources of ground water for public supply, self-supplied, and agricultural users in southeastern Georgia. The Clayton aquifer, however, is gradually being replaced by the Sumter Plains aquifer in most areas around the City of Albany. The Clayton aquifer is short, thin, and unconfined. A large part of the area underlain by this aquifer is approximately 160 square miles, while the Claiborne aquifer extends to about 230 square miles.

Figure 1 shows a map showing the change in water level, contour in feet, decrease in water level, and contour in feet. Figure 2 shows a map of the change in water level, contour in feet. Figure 3 is a histogram produced from National Oceanic and Atmospheric Administration Climatological Data, 1981-1986.

TABLE 1

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**Footnotes:**

1. Stephens County is in the extreme south of the area shown in Figure 1. In 1981, the water level in this county was approximately 20 feet lower than in adjacent counties. This is due to a large pumped well located northeast of the county. In 1982, the water level in this county was approximately 5 feet lower than in 1981.

2. A large pumped well in Sumter County, south of Albany, resulted in lower water levels in the west part of the county in 1981. In 1982, the water level in the central part of the county was approximately 10 feet lower than in 1981. In 1983, the water level in the central part of the county was approximately 5 feet lower than in 1982. The water level in the eastern part of the county was approximately 5 feet higher than in 1981.

3. A large pumped well in Terrell County, east of Albany, resulted in lower water levels in the central part of the county in 1981. In 1982, the water level in the central part of the county was approximately 5 feet lower than in 1981. In 1983, the water level in the central part of the county was approximately 5 feet lower than in 1982. The water level in the eastern part of the county was approximately 5 feet higher than in 1981.

4. A large pumped well in Bacon County, south of Albany, resulted in lower water levels in the central part of the county in 1981. In 1982, the water level in the central part of the county was approximately 5 feet lower than in 1981. In 1983, the water level in the central part of the county was approximately 5 feet lower than in 1982. The water level in the eastern part of the county was approximately 5 feet higher than in 1981.

5. A large pumped well in Dougherty County, south of Albany, resulted in lower water levels in the central part of the county in 1981. In 1982, the water level in the central part of the county was approximately 5 feet lower than in 1981. In 1983, the water level in the central part of the county was approximately 5 feet lower than in 1982. The water level in the eastern part of the county was approximately 5 feet higher than in 1981.

**References:**

McFadden and others (1981) used 11 MGD to determine the annual average withdrawal of water from the aquifer. The annual average withdrawal of water from the aquifer to 15 MGD. The Claiborne aquifer, which supplies water to the City of Albany, increased the effective recharge to the aquifer by 15 MGD. The Claiborne aquifer, which supplies water to the City of Albany, increased the effective recharge to the aquifer by 15 MGD. The Claiborne aquifer, which supplies water to the City of Albany, increased the effective recharge to the aquifer by 15 MGD. The Claiborne aquifer, which supplies water to the City of Albany, increased the effective recharge to the aquifer by 15 MGD.
WATER QUALITY AND CHEMISTRY - CLAYTON AQUIFER

Constituent concentrations in milliequivalents

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<tr>
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Constituent percentages were determined from samples extracted from 15 well locations. Constituents are presented in milliequivalents from parts per million (ppm). Constituent concentrations were obtained on SWRC. The SWRC analytical methods were used to report sodium bicarbonate concentrations in milliequivalents/liter (meq/L). Sodium, calcium, and magnesium concentrations were determined using the SWRC analytical methods.

The calculated concentrations were plotted on a Stiff Diagram and then on a trilinear Piper Diagram.

The Stiff Diagram shows the relationship between calcium, magnesium, sodium, and potassium.

The trilinear (Piper) Diagram shows the relationship between calcium bicarbonate and sodium bicarbonate.

Ground water is considered to be soft when calcium bicarbonate type water is present and hard when sodium bicarbonate type water is present.

Ground water in the Clayton aquifer is generally considered to be soft, with the exception of the upper Clayton unit, which is hard.

The trilinear (Piper) Diagram shows the relationship between calcium bicarbonate and sodium bicarbonate.

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Water quality and chemistry of the Claiborne Aquifer — Georgia Geological Survey

**STIFF DIAGRAMS**
(Constituent concentrations in milliequivalents)

**TRILINEAR PIPER DIAGRAM**
(Constituent concentrations in percents)

**HYDROLOGY AND COMPLIANCE**

**REFERENCE**


