

STATE OF ARKANSAS

Geological and Conservation Commission

Norman F. Williams, Geologist-Director

WATER RESOURCES SUMMARY NUMBER 2

GROUND-WATER TEMPERATURES IN THE
COASTAL PLAIN OF ARKANSAS

By Raymond O. Plebuch

U. S. GEOLOGICAL SURVEY



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Ground-water temperatures in deposits of Cretaceous age

Figure 1 shows ground-water temperatures in relation to well depths in deposits of Cretaceous age in the Coastal Plain of Arkansas. Temperatures range from 62° to 98°F, with unusually high temperatures occurring in the vicinity of Hope in Hempstead County. The reason for these high temperatures has not been determined.

Most of the wells utilizing water from these deposits are in or near the Cretaceous outcrop area in the southwestern part of the State. How-

ever, fresh water also is available from deposits of Cretaceous age in extreme northeastern Arkansas. Piggott in Clay County and a number of towns in southeastern Missouri obtain water from these deposits, although in northeastern Arkansas adequate supplies generally may be obtained from shallower aquifers. Throughout the greater part of the Coastal Plain of Arkansas the deposits of Cretaceous age either lie too far below the surface to be utilized or the water they contain is salty.

Ground-water temperatures in deposits of Tertiary age

Figure 2 shows ground-water temperatures in relation to well depths in deposits of Tertiary age in the Coastal Plain of Arkansas. Water

temperatures in these deposits depend primarily on well depth and range from 62° to 83°F.

Ground-water temperatures in deposits of Quaternary age

Figure 3 shows ground-water temperatures in relation to well depths in deposits of Quaternary age in the Coastal Plain of Arkansas. Water temperatures range from 61° to 69°F, exceeding the mean annual air temperature by 1° to 4°F.

The mean annual air temperature in the Coastal Plain ranges from 60.2° at Corning in Clay County (north) to 65.5°F at Magnolia in Columbia County (south).

Reference

Collins, W. D., 1925, Temperature of water available for industrial use in the United

States: U. S. Geol. Survey Water-Supply Paper 520-F, 7 p., 4 pls.

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Introduction

This report is one of a series resulting from a cooperative program of water-resources investigations in Arkansas between the U. S. Geological Survey and the Arkansas Geological and Conservation Commission. The report is designed to provide information on ground-water temperatures in the Coastal Plain of Arkansas. (See fig. 1.) The principal aquifers or water-bearing

units in the Coastal Plain are deposits of Cretaceous, Tertiary, and Quaternary age. Ground-water temperatures, with respect to well depths, are shown for each of these deposits on separate maps (figs. 1, 2, and 3), which are based on temperature measurements made by various individuals over a number of years.

Ground-water temperatures

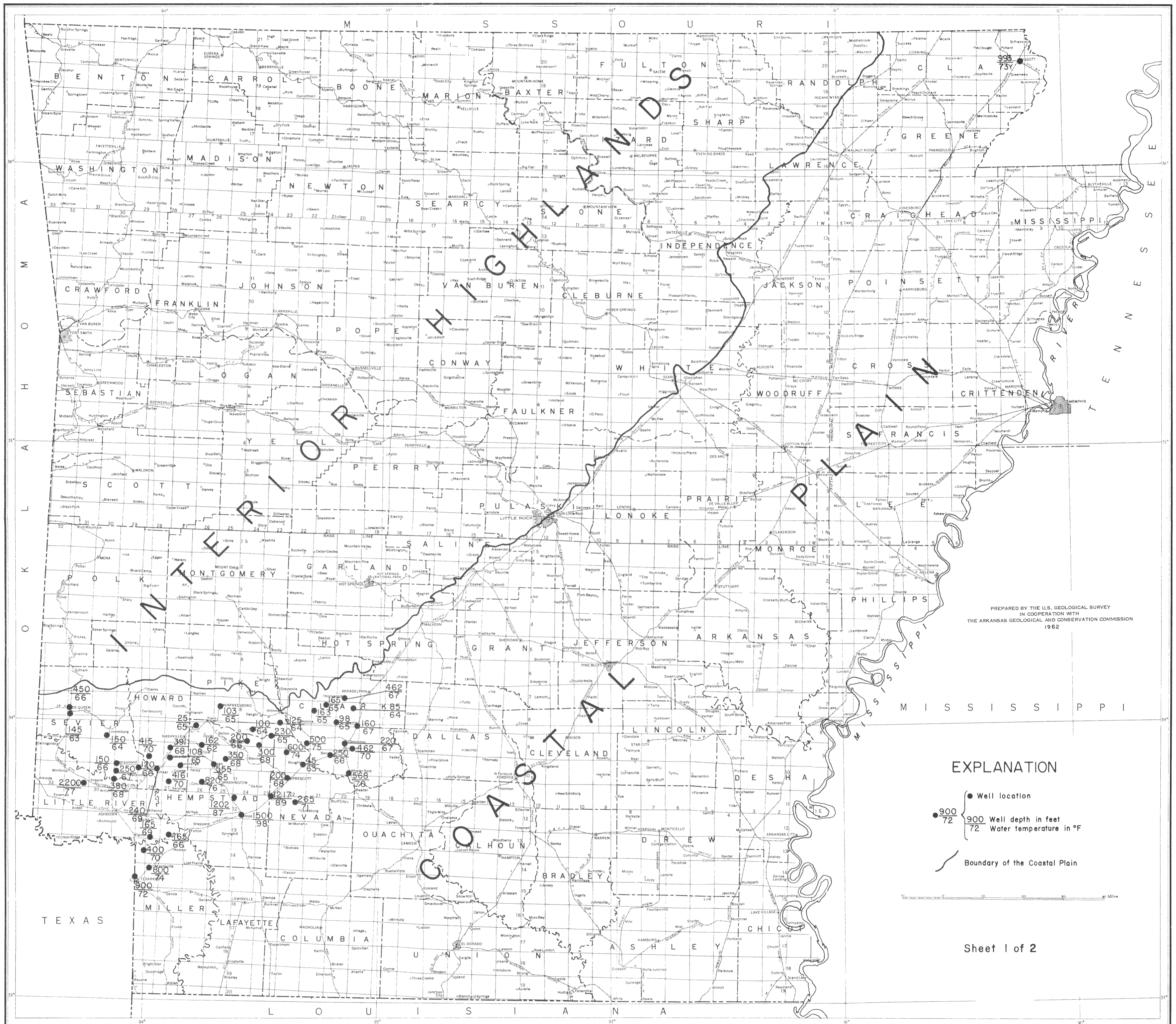
The temperature of ground water close to the land surface is about the same as the mean annual air temperature. Below land surface, water temperatures increase at an average rate of 1°F for each 64 feet of depth (Collins, 1925, p. 97). As a general rule, the temperature of ground water from depths less than 300 feet will be no more than about 5°F above the mean annual air temperature.

The temperature of ground water as measured at the surface does not necessarily represent the true temperature of the water in the aquifer. The following factors should be considered when measuring and interpreting ground-water temperatures:

1. Heating of the pump during long periods of pumping may result in a water temperature

that is several degrees higher than the temperature in the aquifer.

2. If the water as it emerges from the well passes through a pressure tank that is exposed to extreme heat or cold, an abnormal temperature may be obtained.
3. The temperature of water issuing from a deep artesian well having a low rate of flow may be somewhat lower than the temperature of the water in the aquifer. This is due to exposure of the water to decreasing earth temperatures as it slowly rises from the bottom of the well. Some of the apparently low temperatures shown in the southwestern part of the State in figure 1 possibly may be explained in this manner.



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EXPLANATION

- Well location
- $\frac{900}{72}$ 900 Well depth in feet
72 Water temperature in °F
- Boundary of the Coastal Plain

0 10 20 30 40 Miles

FIGURE 1.—GROUND-WATER TEMPERATURES IN DEPOSITS OF CRETACEOUS AGE IN THE COASTAL PLAIN OF ARKANSAS

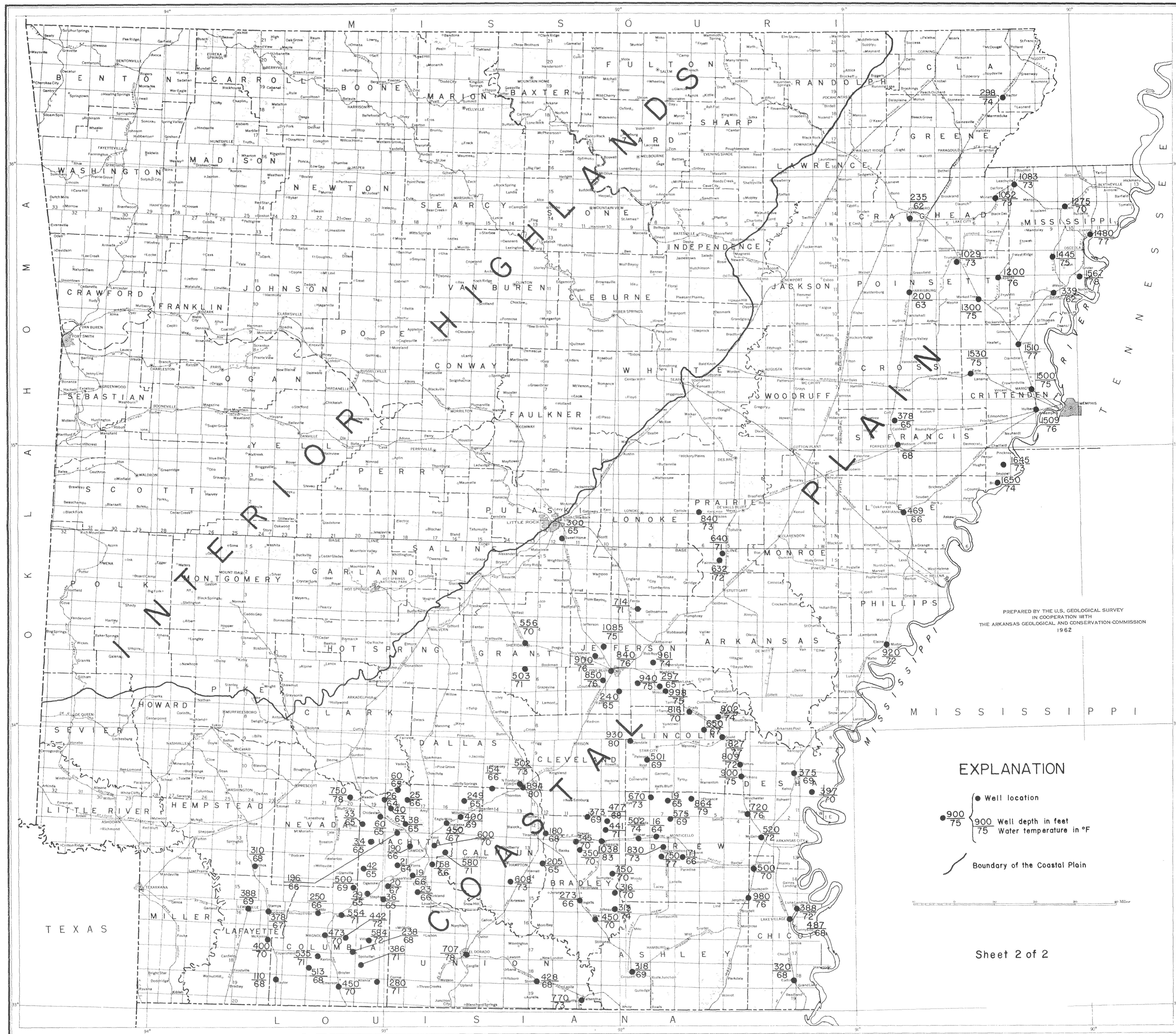


FIGURE 2. GROUND-WATER TEMPERATURES IN DEPOSITS OF TERTIARY AGE IN THE COASTAL PLAIN OF ARKANSAS

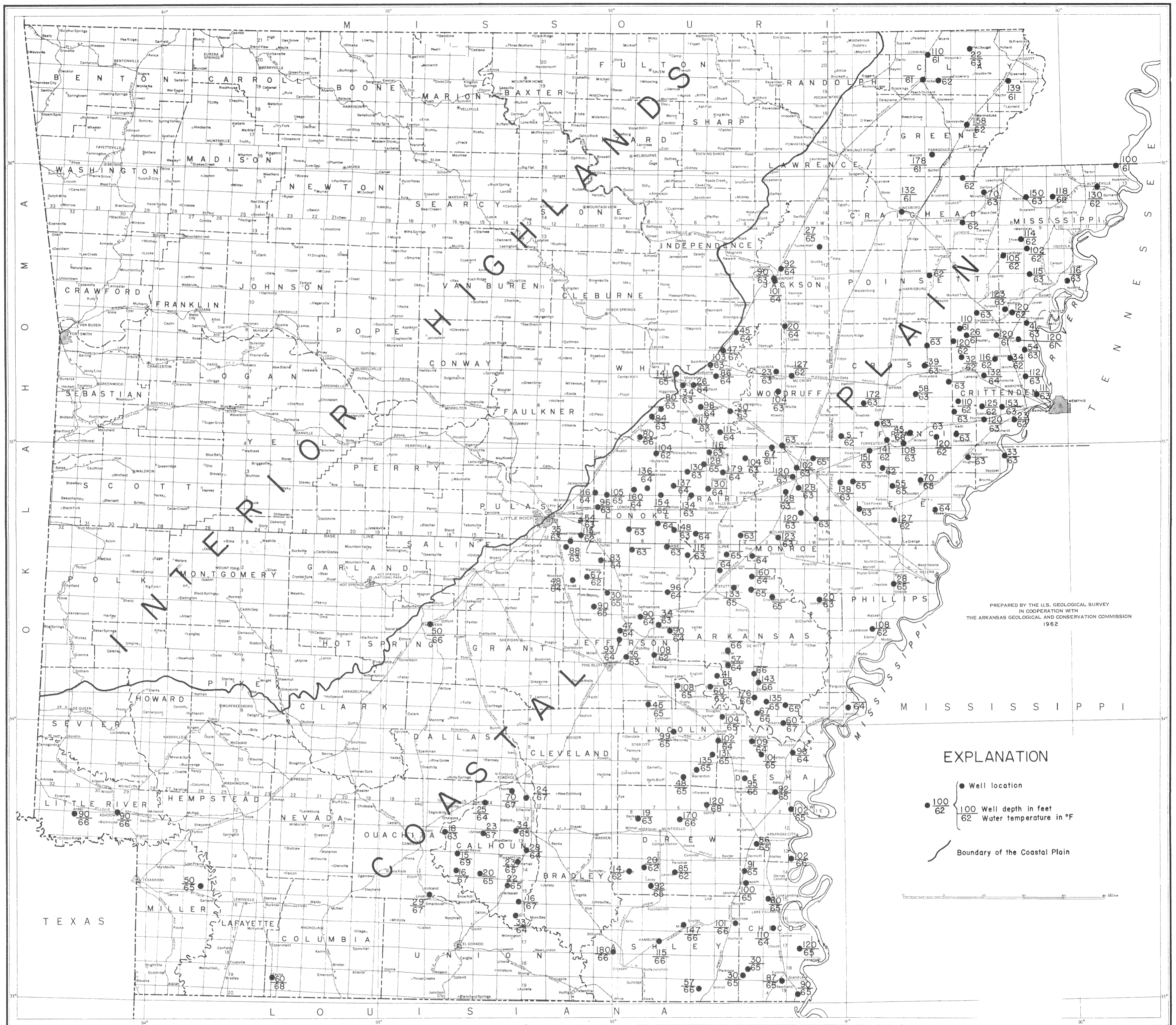


FIGURE 3.—GROUND-WATER TEMPERATURES IN DEPOSITS OF QUATERNARY AGE IN THE COASTAL PLAIN OF ARKANSAS