

STATE OF SOUTH DAKOTA
Nils Boe, Governor

SOUTH DAKOTA GEOLOGICAL SURVEY
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Water Information Circular 2

GLACIAL AQUIFERS IN CAMPBELL COUNTY,
SOUTH DAKOTA

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prepared in cooperation with the
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INTRODUCTION

Water Information Circular 2 is the second in a new series of publications by the South Dakota Geological Survey. It is designed to acquaint the reader with the general distribution, quantity and quality of water from the glacial aquifers in Campbell County. This map is not intended for the purpose of locating wells; it is simply an advance publication showing the general distribution of the aquifers and the location of test holes and wells (Dec. 1966) for which information is available.

A much more detailed and comprehensive report will be published at a later date. The detailed report will consist of three parts. Part I will discuss the geology, Part II the hydrology, and Part III will contain all available data about test holes, water analyses and well inventory data. Copies of this report, when available, may be obtained from the South Dakota Geological Survey.

Figure 1 was compiled from data collected by the South Dakota Geological Survey and the United States Geological Survey during 1964, 1965, and 1966 as part of a detailed geologic and hydrologic investigation of Campbell County. Some test drilling and other data collection will be done during the spring of 1967, therefore, the map of test holes and wells (fig. 1) does not show all the data that will be included in the final report. These maps should only be used as a general reference and are subject to modification pending additional data collection and analysis.

GLACIAL AQUIFERS

Before glaciation Campbell County contained a deeply incised drainage system. Apparently two major drainageways joined in the south-central part of the county and continued eastward leaving the county 2 to 8 miles north of the southeastern corner of the county. As the glacier moved into this area, ice and meltwater deposited much sand and gravel in the bottom of the old river channels. After the ice receded, the partly-filled channels again became a part of the major drainage system, receiving deposits of fine sand, silt and clay. Later, as a younger ice sheet advanced into the area the river channels were dammed with ice and a layer of clay was deposited in the temporary lakes. Finally, the ice overrode the entire area and buried most of the pre-existing deposits under a blanket of glacial debris. The original courses of the old streams were never completely filled with sediments because masses of ice remained in the valleys. At the same time on the adjacent uplands the general ice surface was still higher, thus causing meltwater to deposit sand and gravel on top of the ice contained in the valley. When the buried ice melted, the sand and gravel collapsed forming the rolling sand and gravel plains which extend from Pollock southeastward to Herreid and Mound City and southward to the county line. A continuation of this plain is traceable eastward from Sand Lake through Salt Lake to the McPherson County line. The extensive sand and gravel plains formed an excellent catchment area for rain and melting snow, and this water percolating downward saturated the buried sand and gravel.

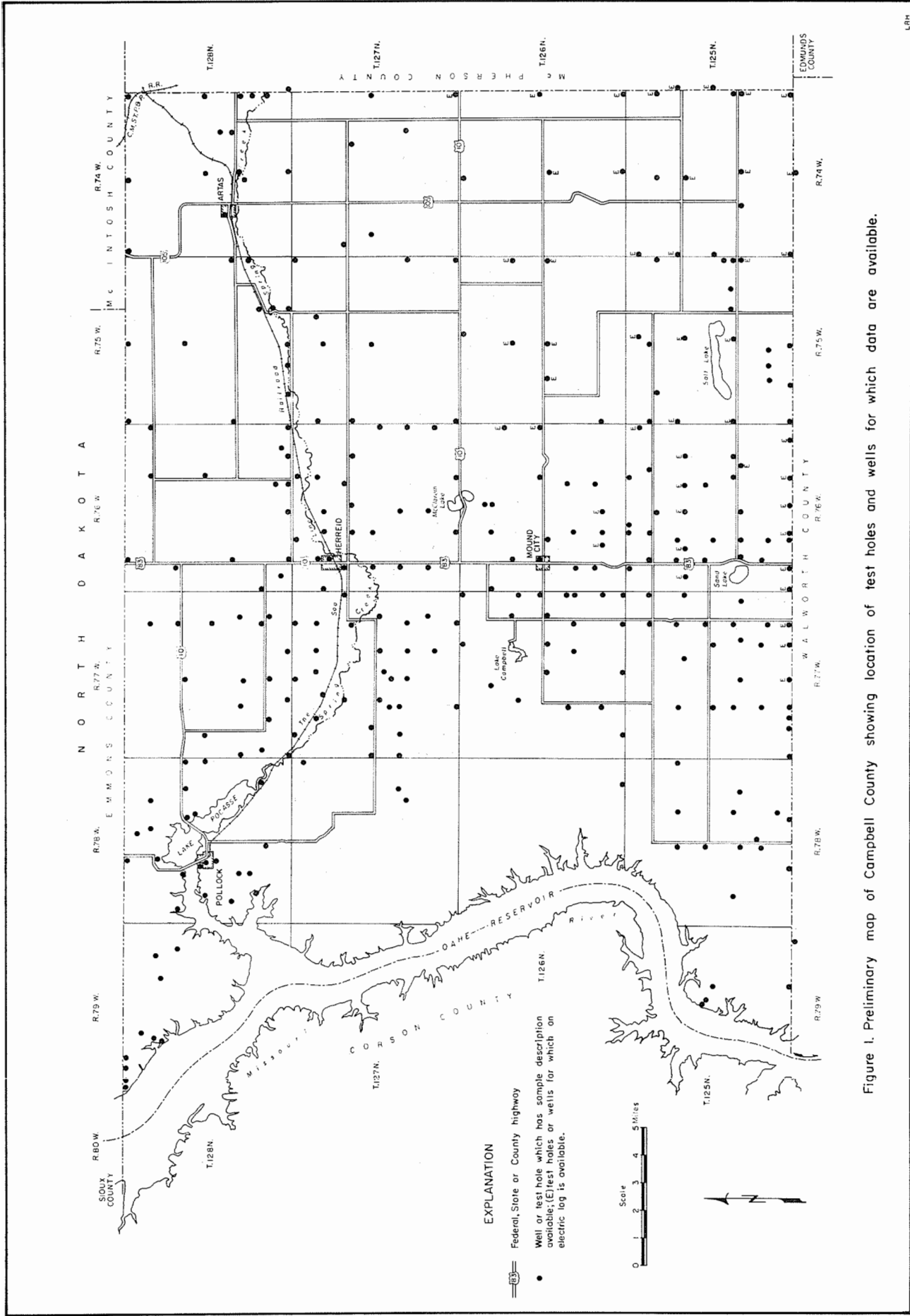


Figure 1. Preliminary map of Campbell County showing location of test holes and wells for which data are available.

The buried sand and gravel in the two valleys constitutes the deep aquifer and the rolling sand and gravel plains constitute the shallow aquifer in Campbell County. The aquifers underlie more than half of Campbell County (fig. 2). The shallow aquifer provides sufficient water for domestic and farm needs from wells 10 to 120 feet deep. Properly constructed wells in the shallow aquifer in the area from Pollock to Herreid and south of Sand Lake could provide water yields up to 200 gallons per minute. The deep aquifer may yield as much as 1,000 gpm to properly constructed water wells at depths ranging from 160 to 400 feet. Its thickness varies considerably; it is thinnest along the sides. The central part of the aquifer ranges in thickness from 60 feet at Pollock to over 200 feet in the southeast part of the county. The water level ranges from 30 to 50 feet below land surface in wells in the deep aquifer.

The water from both aquifers is very hard. Water from the shallow aquifers is predominantly calcium sulfate and calcium bicarbonate with an average dissolved solids content of 970 parts per million. Water in the deep gravel aquifer is predominantly sodium sulfate and sodium bicarbonate water with an average dissolved solids content of 1,600 ppm. The sulfate content of both waters is usually less than that required to create a laxative effect, but it may impart an undesirable taste, especially in water from the deep aquifer.

The aquifers contain enough water to supply an irrigation system in some areas but a test well should be drilled before an irrigation system is constructed, because test drilling will determine the thickness of the aquifer and provide samples for determining grain size. This information will help the driller select the proper size and length of screen to be used. The test well should be pumped to determine the yield and a water sample should be collected for chemical-quality analysis. Analyses of the soil and subsoil, and topographic mapping are also important in determining the suitability of the land for irrigation, and in selecting the most suitable irrigation system.

Persons wishing additional information about the geology and hydrology of Campbell County should contact the South Dakota Geological Survey in Vermillion, or the United States Geological Survey in Huron.

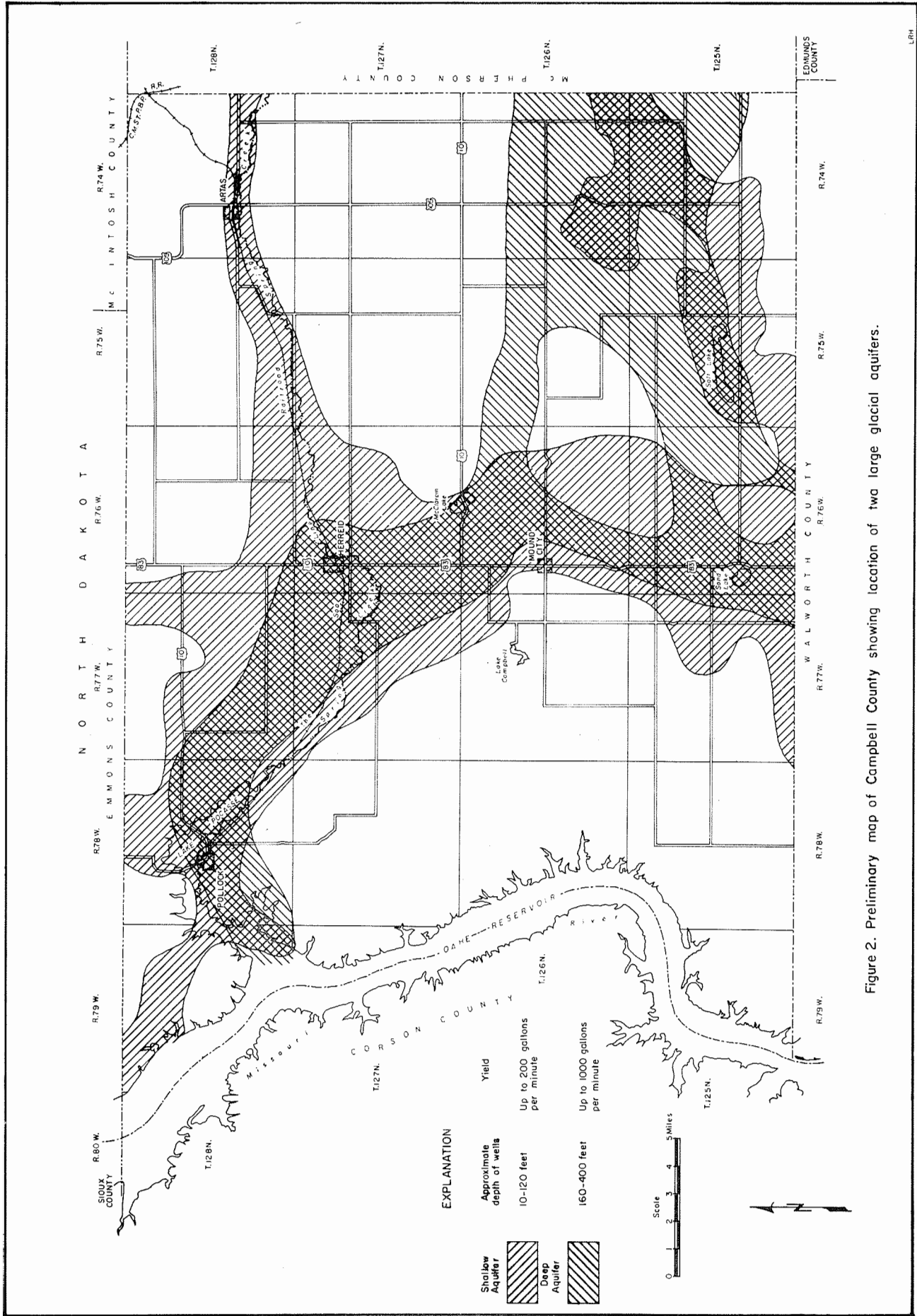


Figure 2. Preliminary map of Campbell County showing location of two large glacial aquifers.