STATE OF SOUTH DAKOTA
Frank Farrar, Governor

SOUTH DAKOTA GEOLOGICAL SURVEY
Duncan J. McGregor, State Geologist

Water Information Circular 4

MAJOR GROUND-WATER AQUIFERS IN BON HOMME COUNTY, SOUTH DAKOTA

by
Cleo M. Christensen
South Dakota Geological Survey

Prepared in cooperation with the United States Geological Survey,
Ft. Randall Water Conservancy Sub-District and Bon Homme County

Science Center
University of South Dakota
Vermillion, South Dakota
1970

CONTENTS

ILLUSTRATIONS

Figure

INTRODUCTION

This publication is the fourth in the series of Water Information Circulars published by the South Dakota Geological Survey. It is designed to acquaint the reader with the general distribution, quantity and quality of water available from the major aquifers in Bon Homme County, South Dakota. A much more detailed report will be published later and will contain additional information available on the hydrology (Jorgensen, in preparation) and geology (Christensen, in preparation).

Information in this report is based on data (fig. 1) collected by the South Dakota Geological Survey and the United States Geological Survey during the summers of 1965-67.

Copies of this publication, and other county reports as they become available, may be obtained from the South Dakota Geological Survey in Vermillion. Persons wishing additional information about the geology and hydrology of Bon Homme County are urged to contact the South Dakota Geological Survey in Vermillion or the United States Geological Survey in Huron.

THE AQUIFERS

Glacial Aquifers

Three major glacial aquifers are present in the county (fig. 2). The 32-square mile Choteau aquifer is adjacent to the lower reach of Choteau Creek. The Tyndall-Scotland aquifer with an area of more than 90 square miles extends from near Springfield to Scotland. The Hubonmix aquifer in northwestern Bon Homme County has an area of about 36 square miles.

Chemical quality of the waters from all three glacial aquifers is such that it may be used for irrigation. However, because the waters are low in sodium and high to very high in salinity they should only be used to irrigate land with good soil drainage.

Figures 3 and 4 show the approximate saturated thickness of the glacial sands and gravels that comprise the Tyndall-Scotland and Choteau aquifers. Locations with more than 50 feet saturated aquifer thickness are likely locations where properly constructed wells may yield enough water to be considered as a source for irrigation. In areas having less than 50 feet of saturated aquifer material, the probability of a well yielding enough water for normal crop irrigation is small and would depend on local conditions at the well site.

Only a limited number of test holes were drilled in the Hubonmix aquifer. Several flowing wells were known to exist in the area and one South Dakota Geological Survey test hole flowed an estimated 50 gallons per minute until cemented. Because of these adverse drilling conditions it was impossible to determine accurately the saturated thickness of the aquifer; however, it is thought that areas with more than a 50-foot saturated thickness do exist.

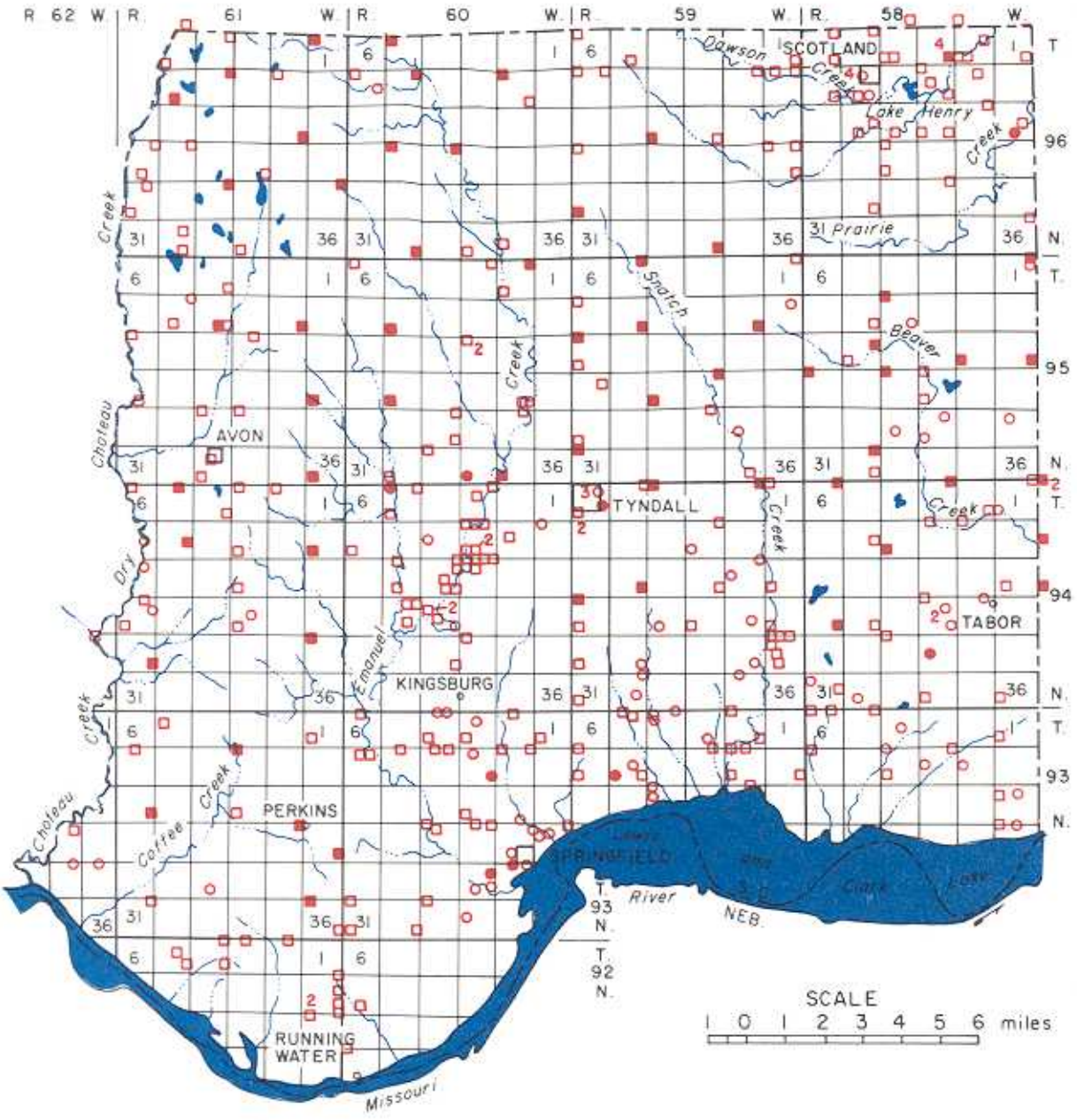
Bedrock Aquifers

The Codell Sandstone Member of the Carlile Shale, a bedrock aquifer that commonly yields "soft" water is widely used for domestic water. Wells completed in this aquifer have small yields and produce water of high sodium and high salinity. In general the yield is too small to be considered as an irrigation supply.

The Niobrara Marl (Chalk rock), shown in figure 5, and layers of sandstone in the Dakota Formation, which underlies the entire county, are also widespread bedrock aquifers in the county. Wells at certain locations in these aquifers could yield more than 0.5 cubic feet per second of water (225 gallons per minute). The water has a low sodium-adsorption ratio and high salinity, and should not be considered for irrigation on soils with poor drainage.

RECOMMENDATIONS

High yield wells such as those generally needed for irrigation should never be constructed without preliminary test drilling. Once a well site is selected, a test well should be installed



- Well with drillers log
- Well with drillers log and electric log
- Test hole with geologic log
- Test hole with geologic log and electric log
- 2 Number is quantity of logs available at that location

Figure 1. Map of Bon Homme County showing locations of wells and test holes for which data are available.

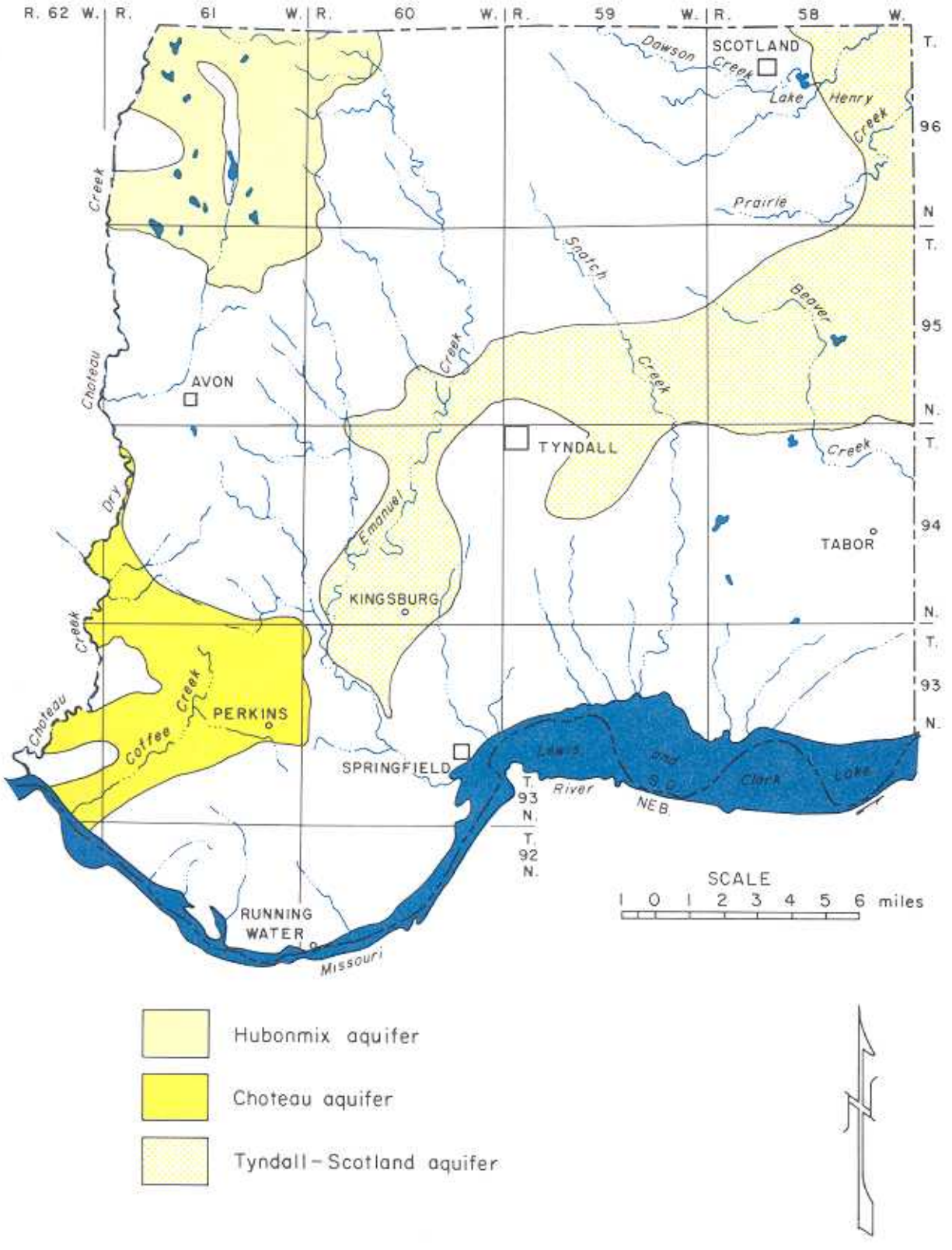


Figure 2. Map of Bon Homme County showing locations of the major glacial aquifer.

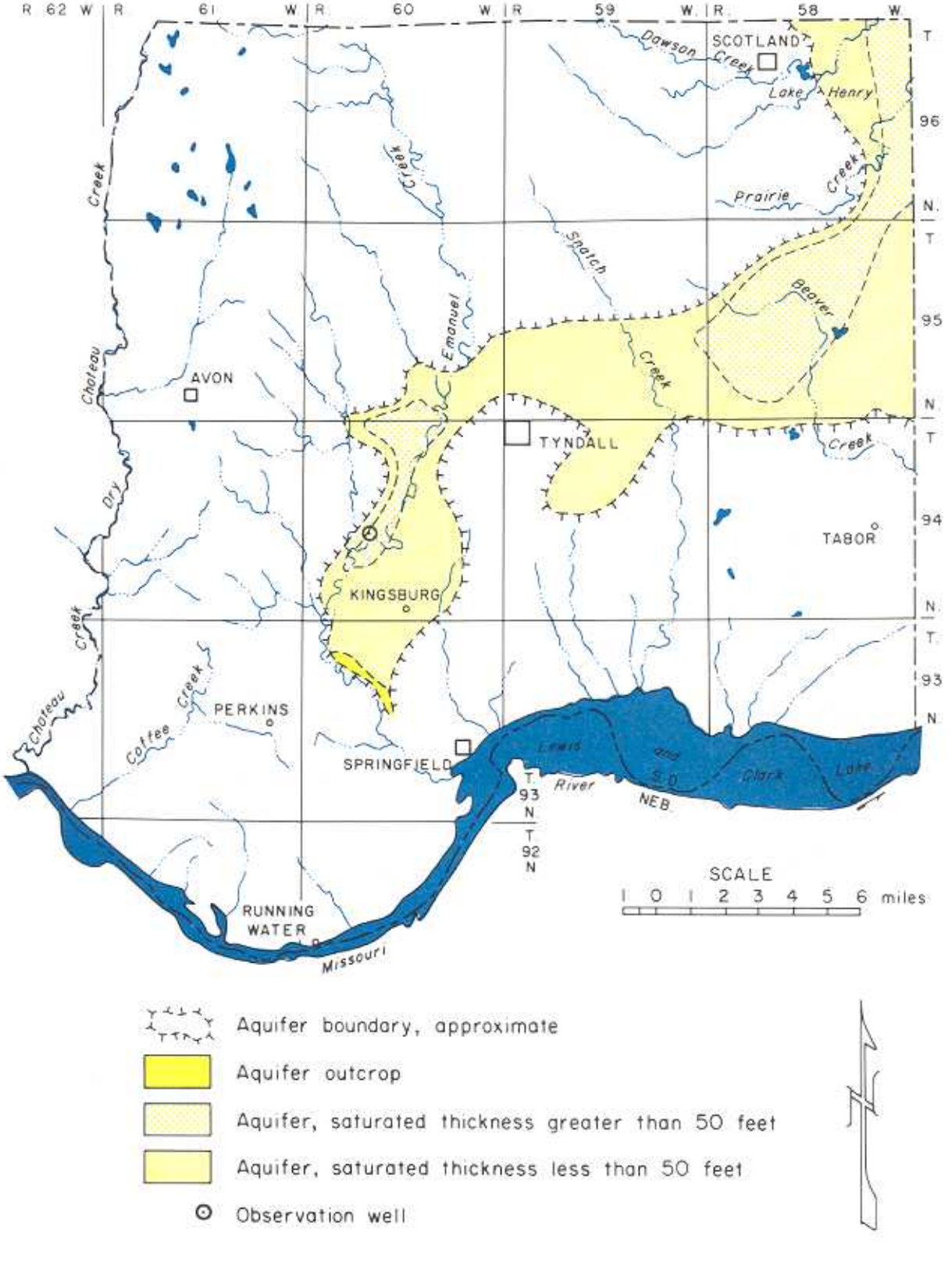


Figure 3. Map of Bon Homme County showing thickness of the Tyndall-Scotland aquifer.

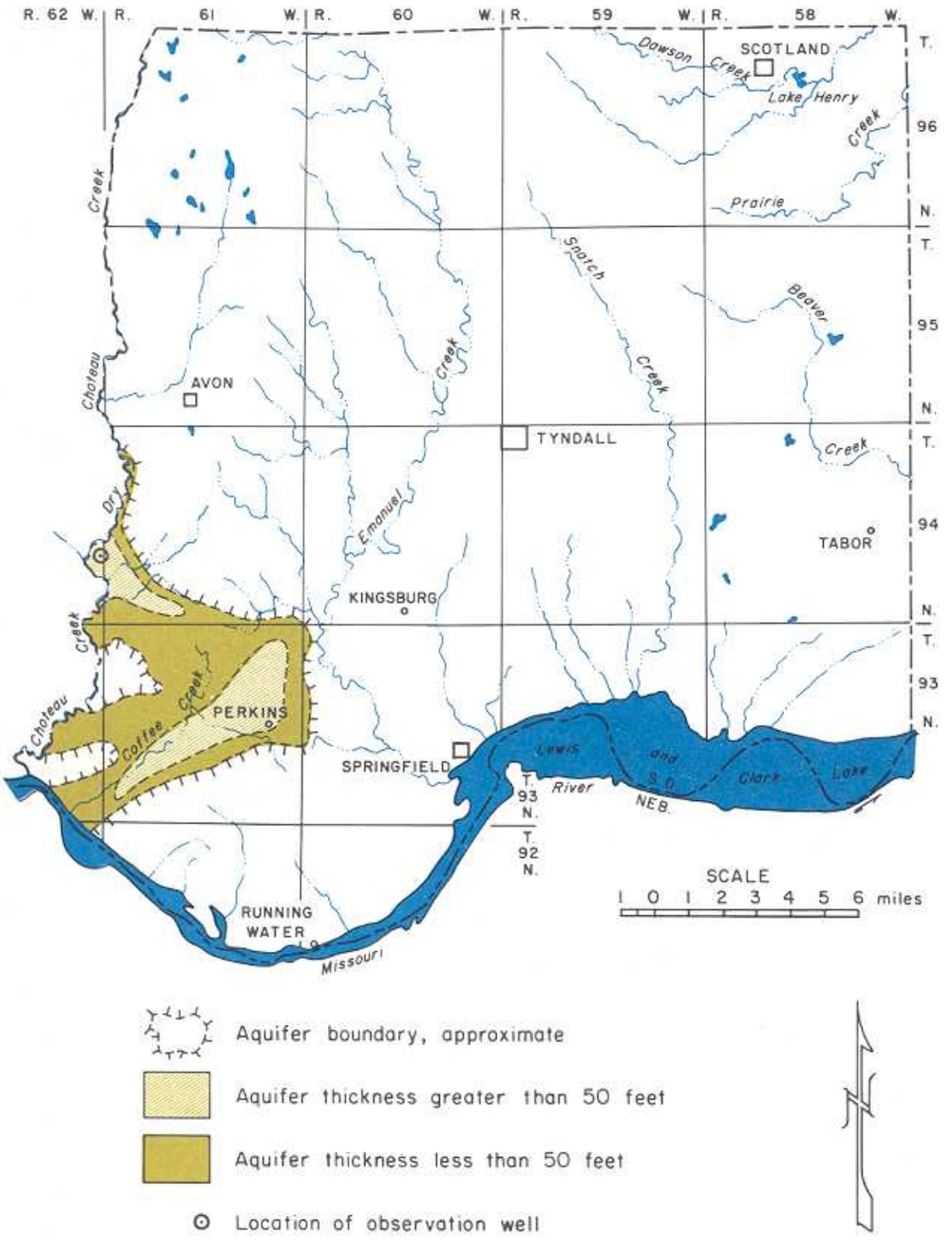


Figure 4. Map of Bon Homme County showing thickness of the Choteau aquifer.

Figure 5. Map of Bon Homme County showing location and depth to Niobrara aquifer.

and pumped to determine yield, drawdown and recovery, and quality of water. Various other preliminaries such as analyses of soil and subsoil conditions and topographic mapping are also desirable in order to choose the most suitable type of irrigation system.

REFERENCES CITED

Christensen, C. M. (in preparation), Geology and water resources of Bon Homme County, South Dakota, Part I, Geology: South Dakota Geol. Survey Bull. 21.

Jorgensen, D. G. (in preparation), Geology and water resources of Bon Homme County, South Dakota, Part II, Water resources: South Dakota Geol. Survey Bull. 21.