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Eastern South Dakota Ground Water Supplies

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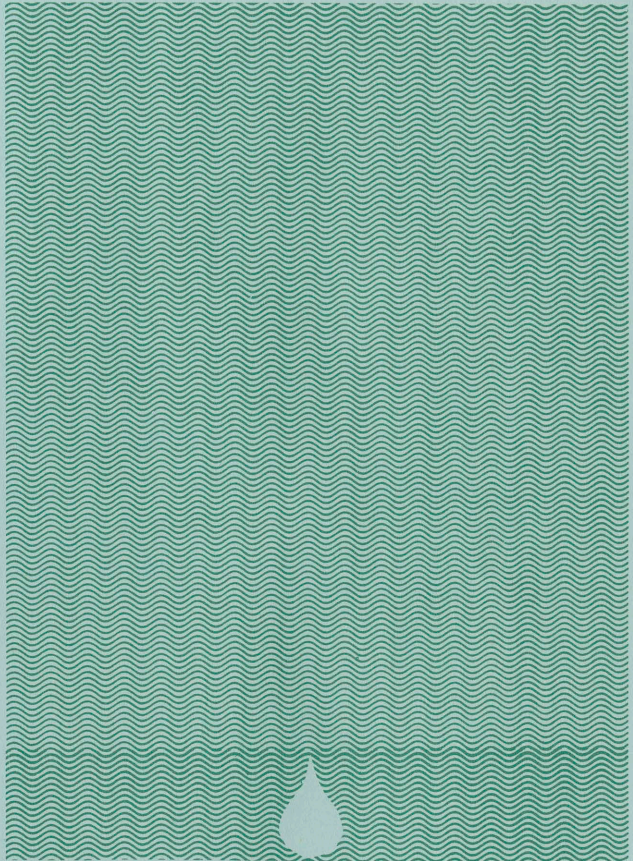
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FS 201



Eastern South Dakota Ground Water Supplies

Cooperative Extension Service
South Dakota State University
U. S. Department of Agriculture

Eastern South Dakota Ground Water Supplies

FS 201

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in cooperation with

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South Dakota's future economic growth will be greatly influenced by development of its natural resources—one of the most important of which is water.

Assembling scientific data pertaining to water and long range planning for its use are essential to economic expansion. Underground water supplies in South Dakota are an important part of this long range planning. They have made up a large part of the total water supplies used in the past. In 1955, for example, 76% of the water used in South Dakota came from underground sources. This was the highest ratio of ground water use to total water use of any state.

Since it is such an important source of water, South Dakota people need to know where underground supplies are available, in what quantities, at what depth, and what is the quality of the water.

This Fact Sheet assembles known facts about ground water and explains a procedure for obtaining more information. Water from the deep sandstone formations (sometimes called "artesian water") is not discussed; only water found in shallow and buried aquifers is considered here.

DEFINITION OF TERMS

Technical geological terms as used in this publication are defined:

AQUIFER—An underground formation such as gravel, sand or bedrock that will yield water.

BEDROCK—The strata lying under soils and other unconsolidated deposits. It is frequently made up of sandstone or limestone as well as impervious layers of shale or quartzite.

OUTWASH DEPOSITS—Sand and gravel once carried by water from the melting ice of glaciers and deposited in layers of varying thicknesses. The best aquifers in South Dakota are usually in outwash deposits.

SHALLOW OUTWASH AQUIFERS—Outwash deposits resulting from ice melt of the last glacier. Usually found along present major streams. These are covered by a thin blanket of fine sands and clays which will not yield large quantities of water.

BURIED AQUIFERS—Channels of ancient streams or outwash deposits of earlier glaciers filled by sand and gravel and buried as later glaciers passed over them. Usually no association exists between buried aquifers and present streams.

HOW WATER GETS INTO AQUIFERS

Water from rain and snow seeps through the soil into shallow and buried aquifers. For this important reason water movement over the ground surface must

be slowed as much as possible to give more time for the water to seep into the soil and eventually enter the aquifer. Less than one-tenth of water falling as rain or snow finds its way into underground storage. Agricultural practices such as contouring and terracing assist in this water movement into the aquifers. Some water enters aquifers from streams that flow over or through them.

This movement of water into aquifers is known as *recharge*. In shallow and buried aquifers, it is usually *local recharge* from water that falls as rain or snow in only the immediate vicinity of the aquifer.

SHALLOW AQUIFERS

The bottom of most shallow aquifers in South Dakota is less than 100 feet below the surface. Thickness of these outwash sands and gravels may vary from only a few feet to as much as 80 feet.

How much water a given well in an aquifer will yield depends on thickness of the outwash and on how coarse and well sorted are the sands and gravels. A well in 60 feet of coarse water-bearing gravel could yield up to 1,500 gallons a minute, while one in a similar thickness of fine sands might not yield more than 200 gallons a minute.

Quality of water in shallow aquifers in South Dakota is generally good. However, water quality tests should always be made before wells are constructed.

Shallow aquifers in South Dakota so far investigated are shown on Map 1. Many investigations are only preliminary but a few are mapped in great detail.

BURIED AQUIFERS

Aquifers buried in ancient river and outwash channels have not been studied as extremely as shallow aquifers in South Dakota. They are found at lower levels than shallow aquifers—from 50 to 600 feet below the surface. Water quality is usually not as good as shallow water, but is much better than "artesian water."

Buried aquifers so far studied are shown on Map 2.

OBTAINING MORE INFORMATION

The 1962 South Dakota Legislature, to assure more information, approved a plan to permit cooperative financing of ground water studies. The plan calls for counties to pay about 25% of study costs, with State and Federal Geological Surveys absorbing the other 75% on a cost sharing basis. Conservancy Sub-districts have been paying one-half of the county's obligation.

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The detailed studies will include: (1) collecting all available data from previous studies and from existing wells; (2) sinking test holes about a mile apart until a pattern of outwash areas or buried aquifers can be determined; and, (3) sinking as many more test holes as necessary to determine boundaries and depth of the water-bearing formations. The 4-inch test holes go to bedrock. If results indicate the bedrock may be water-bearing, tests will continue as far as necessary to determine its potential as a water source. As a part of the survey, quality tests will show for what purposes the water is suitable.

COUNTY'S SHARE OF THE COST

The county's and Conservancy Sub-district's share of the survey cost will be from \$18,000 to \$35,000, depending on size of county and how much data is already available. A survey will normally take 3 years.

Counties desiring studies and wanting to make arrangements should contact the State Geologist, University of South Dakota, Vermillion, or Director of the U. S. Geological Survey, Ground Water Division, Huron.

VALUE TO INDIVIDUAL FARMS

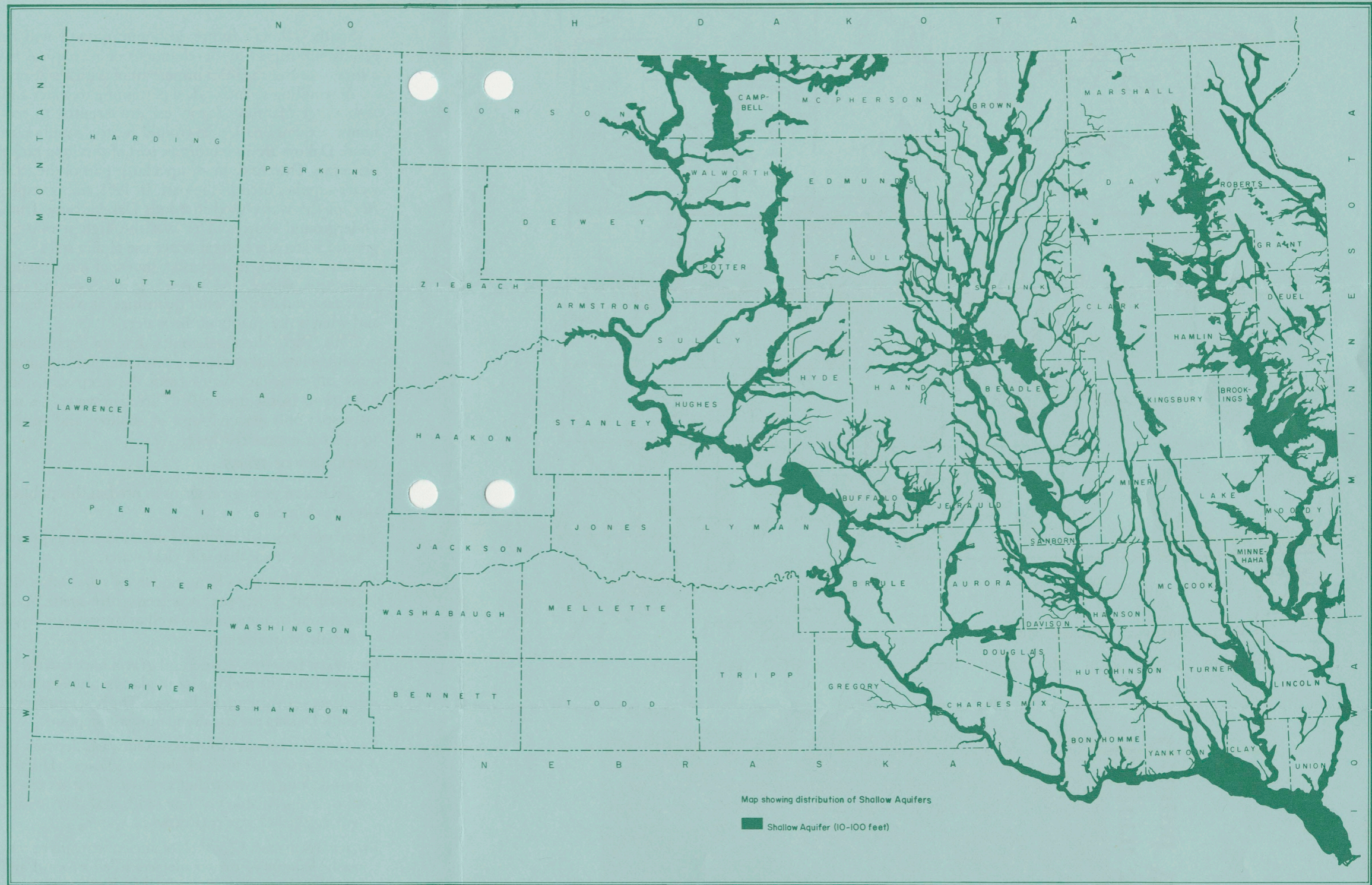
Surveys described above are much more detailed and intensive than those previously attempted by the State and Federal Geological Surveys except for two pilot studies in Sanborn and Beadle Counties. After a study every county landowner will know what resources lie below the surface of his land, including depth and thickness of clay or other impervious layers that may affect internal drainage. All gravel deposits and any other minerals that might have commercial value are mapped. Studies also would determine if adequate amounts of suitable quality water are available for irrigation.

VALUE IN LONG RANGE PLANNING

Information from the studies will also help conservancy sub-districts plan their overall water resources development.

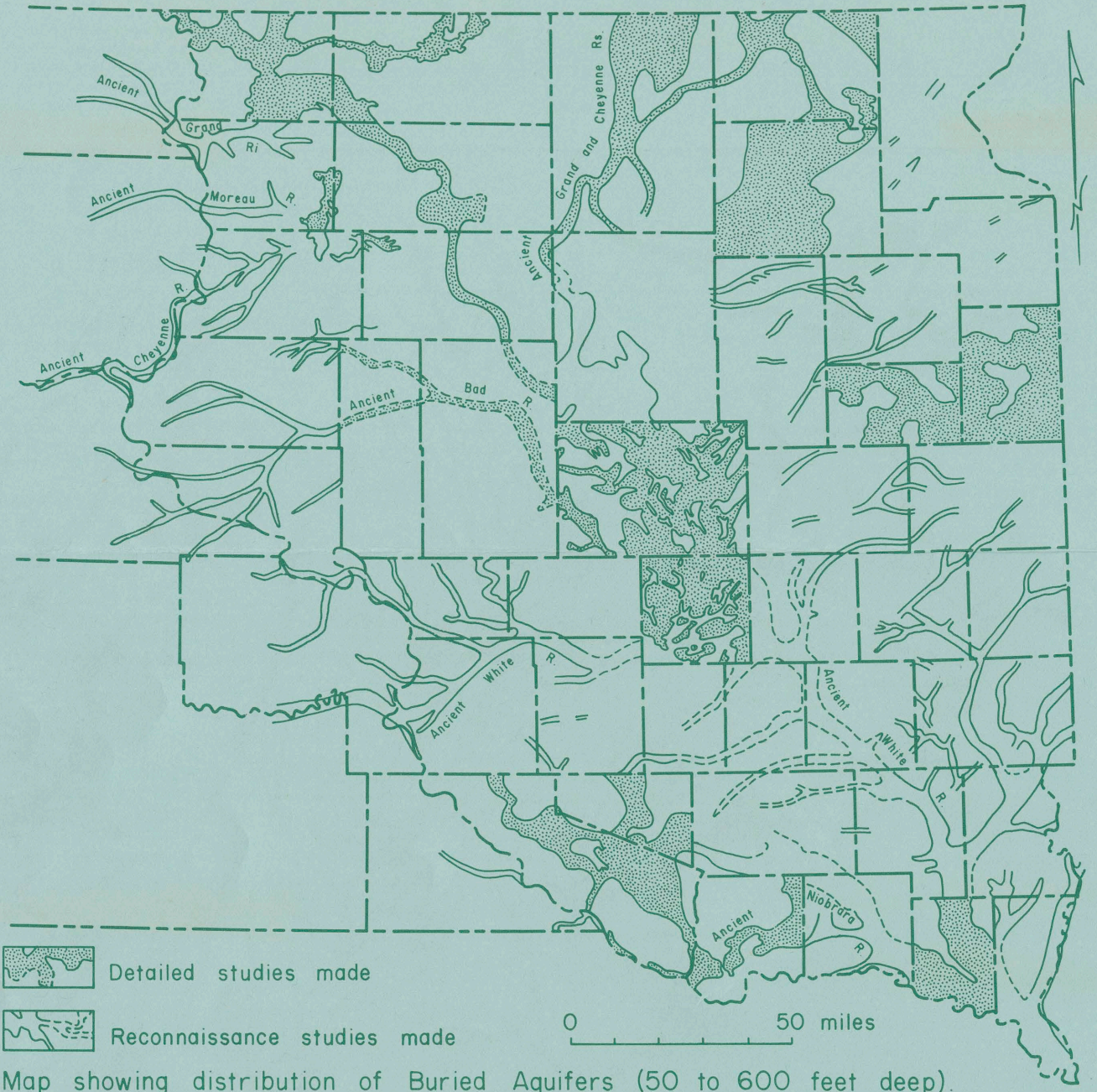
Municipal and industrial development related to underground water resources or mineral deposits will be greatly helped by these studies.

A good development program must be based on scientific knowledge of how many underground resources are available, where they are, and of what kind.



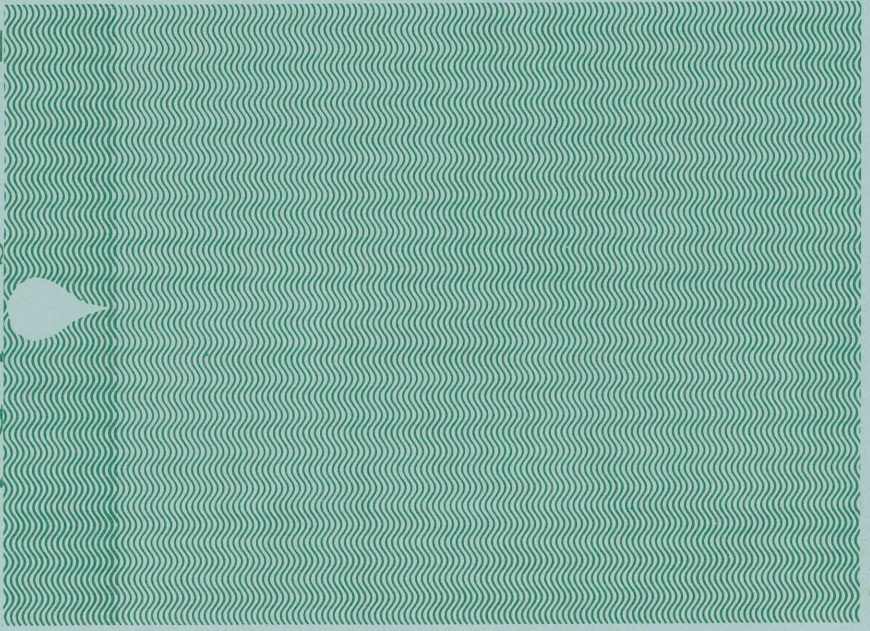
Map 1 (Above) — Shallow aquifers in South Dakota so far investigated. Many are preliminary investigations but a few are mapped in great detail. Note that these shallow aquifers generally follow the courses of present streams.

Map 2 (Next Page) — Aquifers buried in ancient river channels. These formations are deeper than shallow aquifer formations. Note that little similarity exists between location of ancient channels and present streams.



Map showing distribution of Buried Aquifers (50 to 600 feet deep).

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