

STATE OF SOUTH DAKOTA
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SOUTH DAKOTA GEOLOGICAL SURVEY
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Circular 42

**SAND AND GRAVEL RESOURCES IN
CHARLES MIX AND DOUGLAS COUNTIES, SOUTH DAKOTA**

by

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Science Center
University of South Dakota
Vermillion, South Dakota
1972

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INTRODUCTION

This circular is designed to aid in the location and development of sand and gravel resources of Charles Mix and Douglas Counties, South Dakota. It precedes a comprehensive report on the technical aspects of the geology and hydrology; which, with the accompanying basic data, will be published as Bulletin 22.

The purpose of this report is two-fold; (1) to disseminate information about sand and gravel resources as quickly as possible after the field investigation, and (2) to express the technical data in a non-technical format that will be useful to the lay reader. It must be stressed, however, that all of the pertinent geologic data used in compiling the technical reports has also been used in preparing this circular and accompanying map.

It is recommended that the following publications be used as companion references to this circular:

- (a) Evaluation of exploration methods for coarse aggregate in eastern South Dakota: S. Dak. Geol. Survey Report of Investigations 95 Price \$1.50
- (b) Geology and water resources of Charles Mix and Douglas Counties, South Dakota: S. Dak. Geol. Survey. Bull. 22 Price \$2.00
(Not available until 1972)

The first of the above publications explains how sand and gravel maps are prepared from geologic maps and other data; whereas, the second publication contains all the test hole data and other information that was used in compiling this circular.

GEOLOGIC TERMS

Following are some brief definitions and explanations of geologic terms which are presented as an aid to understanding the discussion on occurrence and distribution of sand and gravel deposits.

Outwash

Glacial outwash is a general term referring to any deposit of clay, silt, sand, gravel or boulders that has been washed and sorted, and subsequently deposited by water from melting glaciers. Depending on the amount of washing and sorting action, the material may contain an abundance of silt and clay, or in the other extreme, outwash may consist mostly of boulders. Most outwash is a mixture of material between the two extremes. That is to say an outwash deposit is usually composed primarily of sand and gravel.

Till

Till is the term used for the unsorted and unstratified material lodged beneath a glacier or let down by a glacier as the ice melted away. This mixture for the most part has not been subjected to the action of running water and therefore is a mixture of clay and silt-size particles containing a random mixture of sand, gravel, and boulders. This material is locally called "boulder clay" or "blue clay."

Distribution of till is widespread throughout the two counties. However, within the large area of till there may exist small isolated hills or lenses of outwash material. The size of these hills or lenses may range from a very small knob or patch as small as 100 square feet to an area the size of several acres or several tens of acres. Thickness of the sand and gravel in the knobs or lenses may vary from a thin veneer to over 50 feet; however, in general the thickness will be less than 20 feet. In some cases the larger and thicker isolated knobs and lenses of outwash may contain useable sand and gravel.

Because of complexities in the mechanics of deposition from the ice these small hills and lenses of outwash have a very random occurrence. Their presence cannot generally be determined

unless the outwash material is exposed or unless its presence has been determined through the use of hand auger holes, test holes, or other sampling procedures.

Alluvium

Alluvium may consist of a mixture of clay, silt, sand and gravel that has been deposited by running water since the retreat of the glaciers. These materials may be deposited in stream valleys, small undrained basins or side-hill slopes. The size of the particles deposited will depend primarily on the velocity of the water and may vary from place to place. Occasionally these deposits consist of sand and gravel that may be mined for construction materials.

Bedrock Deposits

Bedrock deposits refer to the consolidated rocks underlying the glacial deposits of till and outwash. In Charles Mix and Douglas Counties the bedrock deposits directly underlying the glacial deposits are sedimentary rocks and consist primarily of shale and chalk. No possibility exists of finding sand and gravel where the bedrock is present at the surface. However, sand and gravel deposits may occur in contact with bedrock deposits along some drainage ways.

MAP EXPLANATION

The map showing sand and gravel deposits of Charles Mix and Douglas Counties is designed to serve two functions: (1) to express the possibility of finding sand and in general areas within the county, and (2) to portray those areas that have been investigated for sand and gravel and to relate the results of the investigations positive or negative, in a manner that is suitable for quick and easy use.

With regard to general information the map has been divided into three areas expressing the probability of discovering previously unmapped supplies of sand and gravel. The areas labeled (G) refer to a relatively high probability, whereas areas labeled (P) refer to a low probability and areas labeled (N) refer to no probability.

The second function of the map is to show the location of all known sand and gravel deposits in the counties. This is done by using a series of symbols and two colors (red and green) to represent various types of data.

A red color pattern shows an area that was found to contain sand and gravel, whereas a green colored area represents an area that was found not to contain sand and gravel. Within these colored areas spot sampling could show exactly the opposite as expected; however this would be the exception rather than the rule.

A (X) on the map indicates the presence of a gravel pit or quarry and no distinction is made between those presently being used or those abandoned.

A number (1,2,—etc.) beside a pit or quarry on the map shows that some type of additional testing data is available at the South Dakota State Department of Highways. These pits are tabulated beginning on page 4.

A (O) represents a test hole that does not contain any useable amount of sand and gravel in the upper 20 feet.

The symbol (●) refers to a test hole that contains a potential useable amount of sand and gravel within 10 feet of the surface.

A symbol (⊙) refers to a test hole that contains sand and gravel within 10 to 20 feet of the surface.

GENERAL HINTS FOR EXPLORATORY PURPOSES

The areas labeled (N) on the map represent those areas in which there is no probability of

finding sand and gravel deposits. These areas correspond geologically to the bedrock areas. In Charles Mix and Douglas Counties the bedrock, with the exception of very limited areas of fine to medium sand, does not contain sand and gravel deposits.

Areas labeled (P) on the map represent the general areas with low probability of finding sand and gravel deposits. Geologically, this area is comprised mostly of till. Throughout the two counties there are many gravel pits developed in till, however in the course of this investigation it was determined that there is no factor suggesting which till area might be more likely to contain sand or gravel. Thus, only those areas that have had an actual test made can be absolutely rated as positive or negative in respect to the presence of sand and gravel.

The only hint for exploration in the area of low probability is to explore those areas adjacent to streams and gullies where sand and gravel deposits may be exposed.

An area labeled (G) on the map represents a higher probability of containing sand and gravel deposits than do either of the other areas. The areas labeled (G) correspond mostly to the areas in which alluvium is present at the surface. With the exception of the Missouri River floodplain the alluvium itself generally is not a source of sand and gravel. The reason these areas have a high probability rating is because the stream valleys containing the alluvium often were channels carrying meltwater streams laden with outwash sand and gravel. This sand and gravel was subsequently covered with the finer silty and clayey material. Drawbacks to development of possible sand and gravel deposits in these areas are (1) the stripping of 5 to 10 feet of compact overburden, and (2) relatively high water table which is almost always within 20 feet of the surface and often is less than 10 feet.

It should be pointed out that the map is a general map to be used only as a guideline for further exploration and development of sand and gravel resources. Development of any specific site would depend upon material specifications for the desired use, and the economies of further exploration and testing as opposed to the use of known resources.

In general, further exploration for sand and gravel deposits in Charles Mix and Douglas Counties should be concentrated in the red areas and those areas labeled (G) on the map. Although sand and gravel deposits do exist in other areas their occurrence are widely disseminated and difficult to locate.

LIST OF KNOWN SAND AND GRAVEL PITS
IN CHARLES MIX AND DOUGLAS COUNTIES

(from South Dakota Department of Highways)

CHARLES MIX COUNTY

| Pit No. | Owner and Address | Description |
|---------|-------------------------------------|---|
| 1 | U. S. Government | SE $\frac{1}{4}$ 25-96-67 |
| 1 | | NE $\frac{1}{4}$ 36-96-67 |
| 2 | Vanderherden, Amel, Platte | SE $\frac{1}{4}$ NW $\frac{1}{4}$ 21-99-68 |
| 3 | Biggens, Frank, Geddes | NW $\frac{1}{4}$ 6-96-67 |
| 4 | Williamson, John, Geddes | NE $\frac{1}{4}$ NE $\frac{1}{4}$ 8-97-66 |
| 5 | Sly, Rex, Platte | SW $\frac{1}{4}$ 14-100-67 |
| 5 | Sly, Rex, Platte | SE $\frac{1}{4}$ 15-100-67 |
| 6 | | NW $\frac{1}{4}$ 28-100-67 |
| 7 | Paulis, John, Wheeler | NW $\frac{1}{4}$ 1-96-68 |
| 8 | Indian Department, Wagner | E $\frac{1}{2}$ 26-94-64 |
| 9 | Casper, H. L., Lake Andes | SW $\frac{1}{4}$ 36-96-65 |
| 10 | Holbeck, Leo, Armour | Lot 1, SW $\frac{1}{4}$ 22-98-64 |
| 11 | Dugan, Tom, Denver, Colorado | SW $\frac{1}{4}$ 30-97-63 |
| 12 | Kuanli, Nels, Dante | NE $\frac{1}{4}$ 3-94-62 |
| 13 | | SW $\frac{1}{4}$ 12-100-67 |
| 14 | Sly, Rex, Platte | NW $\frac{1}{4}$ 12-100-67 |
| 15 | Beckman, Joe, U. S. Government Land | SW $\frac{1}{4}$ 34-96-66 |
| 16 | Slaba, Joseph, Wagner | S $\frac{1}{2}$ NW $\frac{1}{4}$ 20-96-63 |
| 17 | Iverson, Alice | SW $\frac{1}{4}$ 21-99-68 |
| 18 | Van Aspin, Sam | SW $\frac{1}{4}$ NW $\frac{1}{4}$ 23-93-62 |
| 19 | Haney, Marie, Geddes | NW $\frac{1}{4}$ 5-97-66 |
| 20 | Turnover, Ladislar, Geddes | Lot 4 20-97-66 |
| 21 | Hochhalter, Adolph, Geddes | SE $\frac{1}{4}$ NE $\frac{1}{4}$ 25-97-67 |
| 22 | Haney, Marie, Geddes | Lot 6 5-97-67 (Not shown on map) |
| 23 | U. S. Government | NW $\frac{1}{4}$ 31-96-66 |
| 24 | Sly, Rex, Platte | NW $\frac{1}{4}$ 13-100-67 |
| 25 | Bultsma, Henry, Platte | SE $\frac{1}{4}$ SW $\frac{1}{4}$ 30-100-67 |
| 26 | | Lot 2 NW $\frac{1}{4}$ NE $\frac{1}{4}$ 3-93-62 |
| 27 | Focley, Wendall, Platte | NE $\frac{1}{4}$ 14-100-67 |
| 28 | Sly, Rex, Platte | NW $\frac{1}{4}$ 22-100-67 |

Charles Mix County -- continued.

| Pit No. | Owner and Address | Description |
|---------|--------------------------|---|
| 29 | Moisis, J., Dante | SW $\frac{1}{4}$ 10-94-62 |
| 30 | Holbeck, Leo, Armour | NW $\frac{1}{4}$ 27-98-64 |
| 31 | Sly, Rex, Platte | NE $\frac{1}{4}$ 22-100-67 |
| 32 | Soukup, L., Wagner | SE $\frac{1}{4}$ 35-95-64 |
| 33 | Kietzman, D. H., Armour | SE $\frac{1}{4}$ 19-97-63 |
| 34 | U. S. Government | SE $\frac{1}{4}$ 30-96-65 |
| 35 | Walker, Edna, Platte | NE $\frac{1}{4}$ 30-99-68 |
| 36 | Soukup, J., Lake Andes | NE $\frac{1}{4}$ 2-95-65 |
| 37 | Cooper, Estate, Geddes | S $\frac{1}{2}$ SW $\frac{1}{4}$ 17-97-66 |
| 38 | Holbeck, Leo, Armour | NW $\frac{1}{4}$ 27-98-64 |
| 39 | Kriel, Mrs. Vit, Dante | W $\frac{1}{2}$ SE $\frac{1}{4}$ 17-95-62 |
| 40 | Weisser, Emil, Delmont | NE $\frac{1}{4}$ 27-97-62 |
| 41 | U. S. Government | E $\frac{1}{2}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$ 31-96-65 |
| 42 | Feenema, Gerret, Dante | NW $\frac{1}{4}$ SE $\frac{1}{4}$ 3-94-62 |
| 43 | Soukup, J., Wagner | SE $\frac{1}{4}$ 35-96-65 |
| 44 | Cassidy, Anna | W $\frac{1}{2}$ 22-95-65 (Not shown) |
| 45 | Paysby, Paul, Avon | NE $\frac{1}{4}$ NE $\frac{1}{4}$ 1-93-63 |
| 46 | Fullmer, Pershing, Dante | SW $\frac{1}{4}$ 3-94-62 |
| 47 | Kocmick, Joe, Dante | NE $\frac{1}{4}$ SW $\frac{1}{4}$ 27-95-62 |
| 48 | Pier, Phillip, Avon | Lot 5, 6, SW $\frac{1}{4}$ 1-95-61 (Not shown) |
| 49 | Kocmick, Joe, Dante | N $\frac{1}{2}$ SE $\frac{1}{4}$ 27-95-62 |
| 50 | | S $\frac{1}{2}$ 2-98-69 |

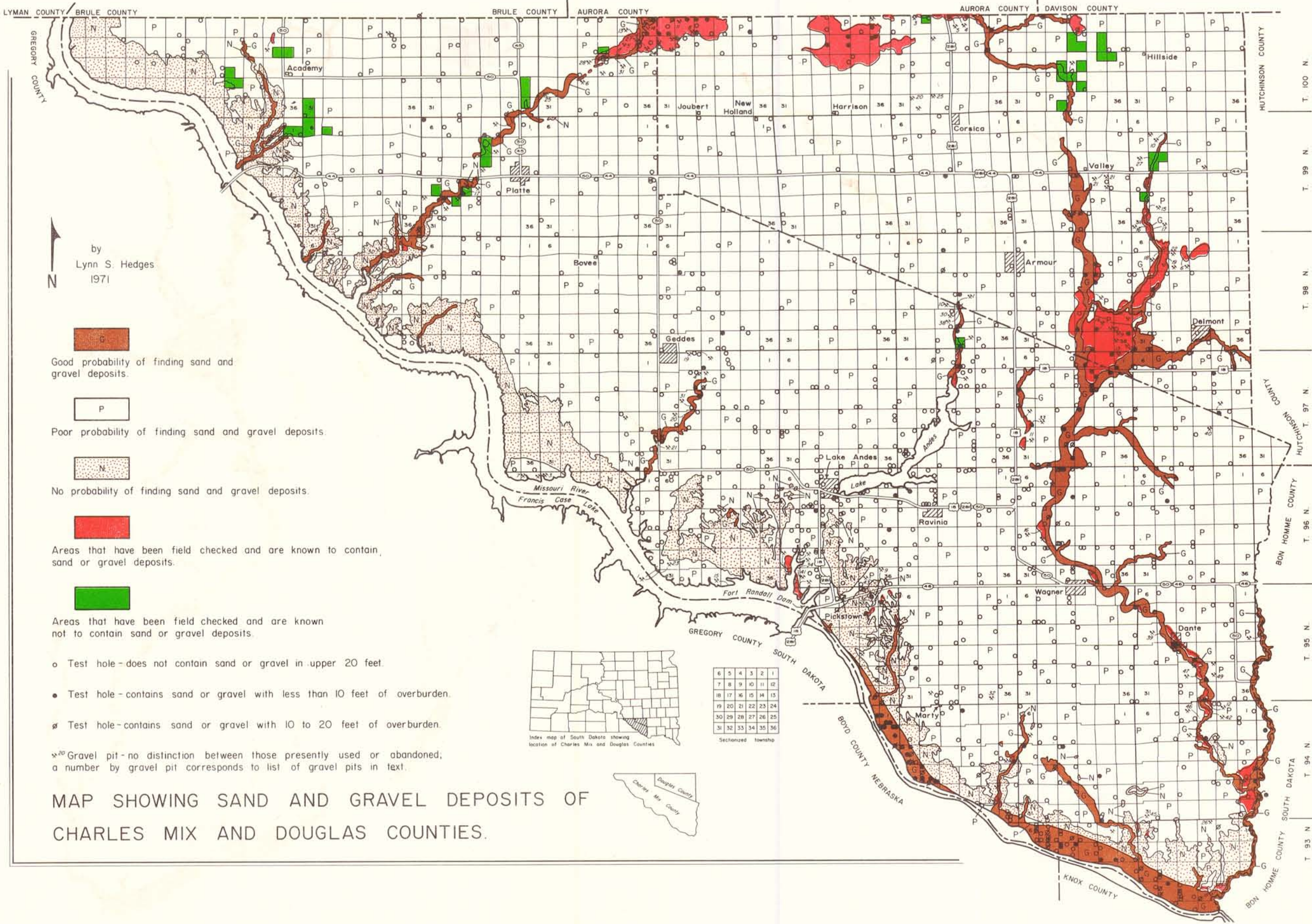
DOUGLAS COUNTY

| Pit No. | Owner and Address | Description |
|---------|---------------------------|---|
| 1 | Holbeck, Leo, Armour | Lot 1, SW $\frac{1}{4}$ 22-98-64 |
| 2 | Grosz, Wm. F., Armour | E $\frac{1}{2}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$ 36-98-63 (Not plotted) |
| 3 | Isakson, John, Corsica | NE $\frac{1}{4}$ NW $\frac{1}{4}$ 8-100-64 |
| 4 | Arnholts, Herman, Platte | NE $\frac{1}{4}$ NW $\frac{1}{4}$ 10-100-64 |
| 5 | Arnholts, Herman, Platte | NW $\frac{1}{4}$ NW $\frac{1}{4}$ 10-100-64 |
| 6 | Goehring, Marion, Delmont | E $\frac{1}{2}$ NE $\frac{1}{4}$ 9-98-62 |

Douglas County -- continued.

| Pit No. | Owner and Address | Description |
|---------|--------------------------------|---|
| 7 | Peacock, F. J., Armour | W $\frac{1}{2}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$ 36-98-63 (Not plotted) |
| 7 | Peacock, F. J., Armour | SE $\frac{1}{4}$ NE $\frac{1}{4}$ 36-98-63 (Not plotted) |
| 8 | Floete, Carl, Armour | SE $\frac{1}{4}$ 8-100-66 |
| 9 | Douglas County | NW $\frac{1}{4}$ 36-98-63 |
| 10 | Buenning, John, Parkston | NE $\frac{1}{4}$ NE $\frac{1}{4}$ 8-99-62 |
| 11 | Floete, Land & Loan., Armour | NW $\frac{1}{4}$ 8-100-66 |
| 12 | Sly, Rex, Platte | NE $\frac{1}{4}$ SW $\frac{1}{4}$ 18-100-66 (Not plotted) |
| 13 | Sanders, Joe, Delmont | NW $\frac{1}{4}$ 1-97-63 |
| 14 | Holtmeyer, H. G., Elliot, Iowa | SW $\frac{1}{4}$ 26-98-63 |
| 15 | Baier, Wilmer | SE $\frac{1}{4}$ 30-99-62 |
| 16 | Fink, Henry, Delmont | SE $\frac{1}{4}$ 31-99-62 |
| 17 | Lang, Art, Delmont | NW $\frac{1}{4}$ 5-98-62 |
| 18 | Brenner, Emanuel, Armour | W $\frac{1}{2}$ NE $\frac{1}{4}$ 8-98-62 |
| 19 | Spease, Olinda, Delmont | NE $\frac{1}{4}$ SE $\frac{1}{4}$ 8-98-62 |
| 20 | Van Roekel, Garian, Corsica | NW $\frac{1}{4}$ 32-100-64 |
| 21 | Lau, Marcus, Rapid City | NE $\frac{1}{4}$ 23-99-63 |
| 21 | Lau, Marcus, Rapid City | SE $\frac{1}{4}$ NE $\frac{1}{4}$ 23-99-63 |
| 22 | Brenner, Emanuel, Armour | NE $\frac{1}{4}$ NE $\frac{1}{4}$ 8-98-62 |
| 23 | Goehring, Delmont | SW $\frac{1}{4}$ 25-98-63 (Not plotted) |
| 24 | Devries, Gerrit, Armour | NE $\frac{1}{4}$ SW $\frac{1}{4}$ 12-100-65 (Not plotted) |
| 25 | Van Roekel, Garian | NW $\frac{1}{4}$ 33-100-64 |
| 26 | Downing, Claude, Corsica | NW $\frac{1}{4}$ 10-100-64 (Not plotted) |
| 27 | Puepke, Henry, Parkston | NW $\frac{1}{4}$ SW $\frac{1}{4}$ 17-99-62 S $\frac{1}{2}$ NW $\frac{1}{4}$ 17-99-62 |
| 28 | | SE $\frac{1}{4}$ 5-98-62 (Not plotted) |

R 71 W R 70 W R 69 W R 68 W R 67 W R 66 W R 65 W R 64 W R 63 W R 62 W R 61 W



by
Lynn S. Hedges
1971

- G
Good probability of finding sand and gravel deposits.
- P
Poor probability of finding sand and gravel deposits.
- N
No probability of finding sand and gravel deposits.
- Areas that have been field checked and are known to contain sand or gravel deposits.
- Areas that have been field checked and are known not to contain sand or gravel deposits.

- o Test hole - does not contain sand or gravel in upper 20 feet.
 - Test hole - contains sand or gravel with less than 10 feet of overburden.
 - ⊗ Test hole - contains sand or gravel with 10 to 20 feet of overburden.
- *²⁰ Gravel pit - no distinction between those presently used or abandoned; a number by gravel pit corresponds to list of gravel pits in text.



| | | | | | |
|----|----|----|----|----|----|
| 6 | 5 | 4 | 3 | 2 | 1 |
| 7 | 8 | 9 | 10 | 11 | 12 |
| 18 | 17 | 16 | 15 | 14 | 13 |
| 19 | 20 | 21 | 22 | 23 | 24 |
| 30 | 29 | 28 | 27 | 26 | 25 |
| 31 | 32 | 33 | 34 | 35 | 36 |

Sectionized township



MAP SHOWING SAND AND GRAVEL DEPOSITS OF CHARLES MIX AND DOUGLAS COUNTIES.