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Information Pamphlet IP-43

**SAND AND GRAVEL RESOURCES IN
LINCOLN COUNTY, SOUTH DAKOTA**

by

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**Prepared in cooperation with the
United States Geological Survey,
South Dakota Department of Transportation,
and Lincoln County**

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ILLUSTRATION

Plate

(Plate is in pocket)

1. Location of test holes, sand and gravel pits, numbered land tracts, and sand and gravel deposits in Lincoln County, SD

INTRODUCTION

This pamphlet is the first in a series of reports on the geology and hydrology of Lincoln County, South Dakota. It is designed to aid in the exploration for sources of sand and gravel. The quality of the material was not analyzed. This would require prior knowledge of the material specifications for each intended use, and more extensive sampling.

Other reports in this series include:

- a. *Major Aquifers in Lincoln and Union Counties, South Dakota*: South Dakota Geological Survey Information Pamphlet, Lindgren, R. (in preparation)
- b. *Water resources of Lincoln and Union Counties, South Dakota*: U.S. Geological Survey Water Resources Investigations Report, Lindgren, R. (in preparation)
- c. *Geology of Lincoln and Union Counties, South Dakota*: South Dakota Geological Survey Bulletin, Hammond, R. H., (in preparation)

Report (a.) describes the yield, quality, and location of major aquifers (water-bearing deposits) in a short pamphlet. Report (b.) is a more technical and more exhaustive investigation of the water resources of the counties. Report (c.) is a scientific investigation of the geology of Lincoln and Union Counties.

GEOLOGIC OVERVIEW

Most of the sand and gravel deposits found in Lincoln County were deposited by glacial ice or meltwater thousands of years ago. Other deposits have resulted from stream deposition since the retreat of the glaciers, and some smaller deposits in the southeastern and south-central part of the county are believed to be of preglacial origin. A short description of geologic terms used in this text follows.

Till

The glaciers were large masses of ice that carried with them debris that was picked up earlier in their routes. Some of this debris, a mixture of clay, silt, sand, gravel, and boulders was deposited directly from the ice and not subjected to the action of running water. Till, the term used to describe this mixture, is locally called "blue clay" or "boulder clay." The majority of Lincoln County is covered by till which is made up primarily of clay and is not considered a source of sand and gravel. However, small isolated sand and gravel hills or lenses may occur within till deposits.

Glacial Outwash

Glacial outwash is the term used to describe any deposit of glacial debris that has been washed

and sorted by flowing glacial meltwater. The material type and grain size of these deposits depends on the velocity of the water that sorted them. Deposits left by slow-flowing streams are made up primarily of silts and clays. Very fast flowing streams may have left stream beds composed entirely of boulders. Most glacial outwash is made up of an assortment of sand and gravel, with minor amounts of silts, clays, and boulders.

Alluvium

Alluvium consists of a mixture of clay, silt, sand, and gravel that has been deposited by present-day streams since the retreat of the glaciers. The grain size of the material deposited is dependent on the same factors that govern the grain size in glacial-outwash deposits and may vary from place to place within the stream valley. Where these deposits consist primarily of sand and gravel, they may be mined as a coarse-aggregate source.

Terrace Deposits

Terrace deposits are flat-topped alluvial or outwash deposits that are remnants of former flood plains. The streams which originally deposited the material have since cut their channels deeper and developed new flood plains at lower levels. Much of the sand and gravel in Lincoln County occurs in this type of deposit.

Bedrock

Bedrock is the older, consolidated rock underlying the glacial deposits. In Lincoln County the bedrock deposits that crop out are sedimentary in origin and consist of the Carlile Shale and the Niobrara Formation. Both are unsuitable as a source of coarse aggregate. Generally, when bedrock units are found at or near the ground surface, no sand or gravel exists below that point.

EXPLANATION OF APPENDICES

Appendix A is a compilation of test holes which encountered sand or gravel in the upper 25 feet. This appendix lists: (a) location of the test hole, (b) depth, and (c) description of sand and gravel intervals. The complete set of drill logs is on file at the office of the South Dakota Geological Survey in Vermillion. The South Dakota Geological Survey, U.S. Geological Survey, South Dakota Division of Water Rights, U.S. Bureau of Reclamation, and private drillers contributed to this list.

Appendix B is a compilation of land tracts that have been tested for sand and gravel by the Department of Transportation or have been bonded with the intent to mine sand and gravel at the Office of Minerals and Mining, Department of Environment and Natural Resources. Both of these departments are located in Pierre, South Dakota. The owner, material type, and where possible, thickness of overburden and aggregate being mined, have been included. The actual thickness of a

deposit may be greater than that mined, because of the depth to the water table, changing material characteristics, or availability of mining equipment that may limit excavation.

EXPLANATION OF THE ILLUSTRATION

Plate 1 at the end of this report shows the location of test holes and sand and gravel pits plus numbered land tracts, as listed in appendix B. It also shows towns, major highways, major lakes, rivers, and creeks.

Test holes are represented by three different symbols. A closed circle (●) represents a location in which sand or gravel was encountered in the upper 25 feet with overburden of 5 feet or less. A square (■) indicates a location at which sand or gravel was encountered in the upper 25 feet, but the overburden exceeds 5 feet. Numbers accompanying these two symbols refer to appendix A, which contains the pertinent information from the test-hole logs. An unfilled circle (○) indicates a location where no sand or gravel was encountered in the upper 25 feet. These are not numbered as they are not listed in the appendices.

Gravel pits are designated by a crossed pick and shovel (⌘). Land tracts listed in appendix B are designated by (⊗) and are numbered. Additional information is on file at the Department of Transportation and the Office of Surface Mining, Department of Environment and Natural Resources, both located at Pierre, South Dakota. No attempt has been made to differentiate the active pits from inactive pits.

To further illustrate the areas of highest probability for locating sand and gravel, the map has been divided into three area types indicating a "good," "fair," or "poor" probability of locating sand and gravel. These areas have been delineated by the use of test drilling, sand and gravel pit locations, soil-survey information, topographic maps, aerial-photo interpretation, and field observations. Areas with "good" and "fair" probability of finding sand and gravel have been assigned a letter on the map and are described in the following section.

Sand and gravel deposits in areas labeled as "good" are generally thick, with thin overburden, and cover a broad area. Areas designated as "fair" are comparatively thinner, have more overburden, or are laterally discontinuous. Some sand and gravel occurs in the area labeled as "poor" as indicated by the test-hole data and numbered land tracts on the map. Although some of these deposits may be productive, they are generally limited and difficult to locate.

Sand and Gravel

Area A consists of large deposits of sand and gravel located in the flood plain and terraces along the Big Sioux River that forms the boundary between South Dakota and Iowa. Although the terraces are found on both sides of the border, only the deposits in South Dakota are discussed here.

The terrace deposits flank the river's flood plain from just south of the Minnehaha County line into Union County. The total surface area of sand and gravel mapped in area A covers approximately

21 square miles. The area along the Big Sioux River has been subdivided into five different units, (A¹ through A⁵) and are described below.

A¹ (designated good): Deposits in this area are a mixture of sand, gravel, and boulders of glacial origin, with a cover of silty alluvium. The average overburden thickness is 5 feet in the test-hole data, but variable throughout. Thicknesses of sand and gravel in excess of 30 feet are common. Shallow water table conditions may limit excavation depth, but do not appear to inhibit pit development which extends south into Union County as described by Jarrett (1988).

A² (designated good): Deposits in this area are similar to those in A¹ and contain outwash deposits of sand, gravel, and boulders with a veneer of alluvium covering them. Underlying these glacial deposits a gravel composed of mainly green quartz and plagioclase feldspar was encountered suggesting a nonglacial source for the material (Green, 1983). An average overburden thickness of 7 feet was calculated from test-hole data and was variable. Thicknesses of sand and gravel exceeding 30 feet are common in this area. In the area just south of Fairview, A² may be split into an upper terrace and lower terrace. Water-table levels are generally lower in the upper terrace compared to those in the lower terrace due to the difference in elevation (Green, 1983). Pit development occurs mainly in the lower terrace area.

A³ (designated good): Here the deposits of sand and gravel are again from a glacial source giving a diversity in material type and grain sizes. This area encompasses approximately 10 square miles, making it the largest of the five subdivisions in letter A. The average overburden of silty alluvium is 6 feet over the entire area, but varies locally. Calculated thicknesses of sand and gravel reached in excess of 40 feet, but here again the shallow water table conditions may limit excavation depth. There are 14 numbered land tracts located in A³, and many are being actively mined.

A⁴ (designated good): Although small in area, only about 1 square mile, this area has high probability for locating sand and gravel. In the test-hole data the average overburden is 2 feet of alluvium and thicknesses of the deposits may exceed 20 feet. This glacial-outwash material has a water table below 20 feet, but may fluctuate with wet and dry year cycles.

A⁵ (designated fair): In this area deposits of sand and gravel cannot be described accurately. In the single test hole drilled, 1 foot of overburden followed by 23 feet of brown sand was encountered. Numbered land tracts are shown which could indicate economic sand and gravel deposits, but the lack of test-hole data makes an accurate description difficult.

Area B (designated fair): This area contains discontinuous sand deposits with minor amounts of gravel found as isolated terrace and valley-floor deposits along Pattee Creek. The sand is a fine-to medium-grained mixture of reworked nonglacial sand and glacial outwash with an average overburden of 11 feet. Thicknesses are generally thin and are quite variable.

Area C (designated fair): Here, valley-floor deposits of fine to coarse sand are located in the valleys of two unnamed creeks. The sand is discontinuous and has a thick average overburden of 12 feet. The entire thickness of the deposit is saturated and is as much as 48 feet thick in test hole 16.

Area D (designated fair): The sand and fine gravel found in this area appear to be valley-floor

remnants of a preglacial sand along East Brule Creek. The deposit extends south into Union County toward the Alcester area. The deposits are covered by more than 15 feet of overburden and are saturated through the entire thickness.

Area E (designated fair): Deposits here are widespread and contain a mixture of glacial outwash and reworked preglacial sands. The average overburden thickness is 11 feet, but varies locally. Extending south into Union County the glacial outwash overlying the preglacial sands has been developed and reaches thicknesses of up to 20 feet (Jarrett, 1988).

Area F (designated fair): This deposit represents a small portion of a valley-train deposit along the valley of the Vermillion River. The majority of the test-hole data shows overburden thickness greater than 5 feet with an average of 9 feet. The bulk of the deposit in area F contains fine to medium grained glacial sand with some deposits of gravel. High water-table conditions may inhibit economic development of this area.

Area G (designated good): Sand and gravel deposits in area G come in the form of glacial-outwash terraces and valley-floor outwash along Long Creek. The combined surface area mapped in area G is approximately 6 square miles, making it the second largest area of deposition for sand and gravel in Lincoln County. Overburden thicknesses are generally low and average just over 4 feet. Calculated thicknesses of sand and gravel average 20 feet with local thicknesses of over 40 feet common in the test-hole data. Deposits contain a mixture of sand, gravel, and boulders with a diversity of material type and grain sizes. Although the area has already been heavily developed, the potential for economic sand and gravel resources still exists in this area.

Area H (designated fair): This area contains a fine to medium, preglacial sand that crops out near Newton Hills State Park. No test-hole data exist within the boundary lines, but the sand may in part be a result of eolian deposition (Hammond, R.H., South Dakota Geological Survey, personal communication, 1988).

Area I (designated fair): Sand and gravel deposits of terrace outwash and valley-floor outwash occur in this area along South Fork Beaver Creek. Average overburden thickness is 10 feet, but again varies locally. The terrace deposits are discontinuous bodies of glacial sand and gravel, while the valley-floor deposits may be preglacial fine to medium sands. Pits have been developed throughout the entire area and numbered land tracts are clustered in the most eastern part of area I.

Area J (designated fair): This area is similar to area I and contains widespread terrace-outwash and valley-floor deposits along Beaver Creek. The terrace deposits have a general overburden of less than 5 feet, while the valley-floor deposits have an overburden in excess of 5 feet with an overall average of 14 feet. Thicknesses of the sands and gravels are quite variable and range to over 40 feet.

The remainder of Lincoln County has been mapped as "poor," although isolated areas of sand and gravel deposits occur. One such example is located in an area 5 miles north of the city of Lennox where test-hole data show small hills and knobs of sand and gravel. Due to the random occurrence of such features, exploration efforts that will yield high probabilities of finding sand and gravel should be concentrated in areas designated as "good" and "fair."

ECONOMIC CONSIDERATIONS

It should be emphasized that this study is quite general and should be used only as a guide to further exploration and development of the sand and gravel resources in Lincoln County. The development of a specific site will depend upon material specifications for the desired use, development costs, transportation costs, and future markets.

REFERENCES CITED

- Green, S. A., 1983, *Ground-water study for the city of Fairview, South Dakota*: South Dakota Geological Survey Open-File Report 35-UR.
- Jarrett, M. J., 1988, *Sand and gravel resources in Union County, South Dakota*: South Dakota Geological Survey Information Pamphlet 39.

APPENDIX A. List of test holes in Lincoln County, South Dakota, which encountered sand or gravel within 25 feet of the land surface.

Lithologic descriptions, as listed, have been condensed from data contained in logs on file at the South Dakota Geological Survey, Vermillion, South Dakota, and contain only information which has been deemed most useful for this study. Numerical values indicate depth in feet below land surface.

TEST HOLE NUMBER: 1
LOCATION: 096N-47W-19CCCC
LEGAL LOCATION: SW SW SW SW sec. 19, T. 096 N., R. 47 W.

0 - 7 Gravel, very coarse; boulders

TEST HOLE NUMBER: 2
LOCATION: 096N-48W-03CCCC
LEGAL LOCATION: SW SW SW SW sec. 03, T. 096 N., R. 48 W.

22 - 25 Sand, fine to medium
27 - 38 Sand, fine to coarse

TEST HOLE NUMBER: 3
LOCATION: 096N-48W-04ABBA 1
LEGAL LOCATION: NE NW NW NE sec. 04, T. 096 N., R. 48 W.

3 - 16 Sand, medium

TEST HOLE NUMBER: 4
LOCATION: 096N-48W-15BBAB
LEGAL LOCATION: NW NE NW NW sec. 15, T. 096 N., R. 48 W.

6 - 27 Sand, gray to black, gravelly

TEST HOLE NUMBER: 5
LOCATION: 096N-48W-15DCCC
LEGAL LOCATION: SW SW SW SE sec. 15, T. 096 N., R. 48 W.

12 - 31 Sand, light-brown, fine to medium, silty; moist to saturated, oxidized

TEST HOLE NUMBER: 6
LOCATION: 096N-48W-15DDDD
LEGAL LOCATION: SE SE SE SE sec. 15, T. 096 N., R. 48 W.

10 - 14 Sand, dark-brown, fine to medium, clayey; oxidized, moist

TEST HOLE NUMBER: 7
LOCATION: 096N-48W-16BBBB
LEGAL LOCATION: NW NW NW NW sec. 16, T. 096 N., R. 48 W.

17 - 19 Sand, medium; with clay layers

TEST HOLE NUMBER: 8
LOCATION: 096N-48W-22BBBB

LEGAL LOCATION: NW NW NW NW sec. 22, T. 096 N., R. 48 W.

22 - 25 Gravel, coarse, sandy, angular
31 - 42 Gravel, coarse, sandy, angular

TEST HOLE NUMBER: 9

LOCATION: 096N-48W-23AAAA

LEGAL LOCATION: NE NE NE NE sec. 23, T. 096 N., R. 48 W.

2 - 38 Sand and gravel, medium to coarse, very coarse from 16 feet down

TEST HOLE NUMBER: 10

LOCATION: 096N-48W-23CDDD

LEGAL LOCATION: SE SE SE SW sec. 23, T. 096 N., R. 48 W.

15 - 20 Sand; with clay
20 - 38 Sand and gravel, medium to coarse

TEST HOLE NUMBER: 11

LOCATION: 096N-48W-24BAAA

LEGAL LOCATION: NE NE NE NW sec. 24, T. 096 N., R. 48 W.

2 - 36 Sand and gravel, medium to coarse, very coarse from 20 feet down

TEST HOLE NUMBER: 12

LOCATION: 096N-48W-24CADA

LEGAL LOCATION: NE SE NE SW sec. 24, T. 096 N., R. 48 W.

0 - 2 Gravel, reddish-brown, clayey, sandy; oxidized, dry
2 - 8 Sand, reddish-brown, clayey; oxidized, dry
8 - 13 Gravel, reddish-brown, cobble size, sandy; oxidized, moist; clean
13 - 26 Sand, reddish-brown, gravelly; oxidized, moist; clean
26 - 45 Sand and gravel, reddish-brown; oxidized, saturated; clean

TEST HOLE NUMBER: 13

LOCATION: 096N-48W-25BBAA

LEGAL LOCATION: NE NE NW NW sec. 25, T. 096 N., R. 48 W.

7 - 54 Gravel, coarse; this interval sampled

TEST HOLE NUMBER: 14

LOCATION: 096N-48W-26CDDD

LEGAL LOCATION: SE SE SE SW sec. 26, T. 096 N., R. 48 W.

3 - 31 Sand and gravel, medium to coarse

TEST HOLE NUMBER: 15

LOCATION: 096N-48W-31DAAD

LEGAL LOCATION: SE NE NE SE sec. 31, T. 096 N., R. 48 W.

20 - 30 Sand, brown, coarse, slightly clayey, pebbly; oxidized, saturated

TEST HOLE NUMBER: 16
LOCATION: 096N-48W-32BAAA
LEGAL LOCATION: NE NE NE NW sec. 32, T. 096 N., R. 48 W.

10 - 28 Sand, brown, fine to medium, clayey; saturated
28 - 58 Sand, brown, coarse; saturated; very clean

TEST HOLE NUMBER: 17
LOCATION: 096N-48W-34AAAA
LEGAL LOCATION: NE NE NE NE sec. 34, T. 096 N., R. 48 W.

10 - 12 Sand, coarse, silty
16 - 37 Sand and gravel, medium to coarse

TEST HOLE NUMBER: 18
LOCATION: 096N-48W-35CDDD
LEGAL LOCATION: SE SE SE SW sec. 35, T. 096 N., R. 48 W.

4 - 5 Sand, medium

TEST HOLE NUMBER: 19
LOCATION: 096N-48W-35CDDD 2
LEGAL LOCATION: SE SE SE SW sec. 35, T. 096 N., R. 48 W.

7 - 35 Sand, medium to coarse

TEST HOLE NUMBER: 20
LOCATION: 096N-48W-36CCCC
LEGAL LOCATION: SW SW SW SW sec. 36, T. 096 N., R. 48 W.

4 - 8 Gravel, coarse to cobbly, silty; dry, oxidized
8 - 23 Sand, rusty-brown, fine to medium, silty; moist, oxidized
23 - 52 Gravel, rusty-brown, silty, sandy; moist, saturated, oxidized

TEST HOLE NUMBER: 21
LOCATION: 096N-48W-36DCCD
LEGAL LOCATION: SE SW SW SE sec. 36, T. 096 N., R. 48 W.

8 - 18 Sand and gravel, medium to coarse
18 - 37 Sand and gravel, medium

TEST HOLE NUMBER: 22
LOCATION: 096N-49W-12BABB
LEGAL LOCATION: NW NW NE NW sec. 12, T. 096 N., R. 49 W.

13 - 17 Gravel
20 - 23 Sand

TEST HOLE NUMBER: 23
LOCATION: 096N-49W-23AADD
LEGAL LOCATION: SE SE NE NE sec. 23, T. 096 N., R. 49 W.

15 - 28 Sand, pale-light-brown, slightly clayey; saturated, oxidized

TEST HOLE NUMBER: 24
LOCATION: 096N-49W-33DCDC
LEGAL LOCATION: SW SE SW SE sec. 33, T. 096 N., R. 49 W.

9 - 58 Sand, brown, very coarse; with much very fine to fine gravel, some pink and greenish-colored grains

TEST HOLE NUMBER: 25
LOCATION: 096N-49W-34ADDD
LEGAL LOCATION: SE SE SE NE sec. 34, T. 096 N., R. 49 W.

26 - 50 Sand, brown, medium, very clayey; oxidized, saturated

TEST HOLE NUMBER: 26
LOCATION: 096N-49W-35ABBA
LEGAL LOCATION: NE NW NW NE sec. 35, T. 096 N., R. 49 W.

13 - 23 Sand

TEST HOLE NUMBER: 27
LOCATION: 096N-50W-13BCBB 1
LEGAL LOCATION: NW NW SW NW sec. 13, T. 096 N., R. 50 W.

25 - 28 Sand

TEST HOLE NUMBER: 28
LOCATION: 096N-50W-14BBCB
LEGAL LOCATION: NW SW NW NW sec. 14, T. 096 N., R. 50 W.

2 - 31 Sand and gravel, brown, medium to coarse sand, medium gravel, clayey; oxidized, saturated at 10 feet
31 - 35 Sand and gravel, gray, medium to coarse sand, medium gravel, clayey; unoxidized, saturated

TEST HOLE NUMBER: 29
LOCATION: 096N-50W-22ADAA
LEGAL LOCATION: NE NE SE NE sec. 22, T. 096 N., R. 50 W.

15 - 35 Gravel, reddish-brown, fine, clayey, sandy; oxidized, saturated

TEST HOLE NUMBER: 30
LOCATION: 096N-50W-23CDCC
LEGAL LOCATION: SW SW SE SW sec. 23, T. 096 N., R. 50 W.

16 - 36 Sand, light-brown, medium, clayey; oxidized, saturated
36 - 42 Sand, light-brown, coarse, very clayey; oxidized

TEST HOLE NUMBER: 31
LOCATION: 096N-50W-26BABA
LEGAL LOCATION: NE NW NE NW sec. 26, T. 096 N., R. 50 W.

10 - 13 Gravel
20 - 22 Sand

25 - 40 Sand (loess?)

TEST HOLE NUMBER: 32

LOCATION: 096N-50W-36CDDC

LEGAL LOCATION: SW SE SE SW sec. 36, T. 096 N., R. 50 W.

9 - 16 Gravel, brown; with coarse and very coarse sand, and with one-half inch cream-colored limestone fragments
16 - 33 Sand, medium to very coarse; with little or no gravel

TEST HOLE NUMBER: 33

LOCATION: 096N-51W-01AABB

LEGAL LOCATION: NW NW NE NE sec. 01, T. 096 N., R. 51 W.

5 - 7 Sand, yellow, medium
21 - 23 Gravel, sandy
29 - 65 Gravel, reddish-brown, medium, sandy, subangular to subround, poorly sorted; some "western sand" at 60 to 65 feet

TEST HOLE NUMBER: 34

LOCATION: 096N-51W-06BABA

LEGAL LOCATION: NE NW NE NW sec. 06, T. 096 N., R. 51 W.

8 - 26 Sand, brown, coarse, clayey, poorly sorted; saturated, oxidized
26 - 60 Sand and gravel, light-gray, fine sand, medium gravel, poorly sorted, clayey; saturated, unoxidized

TEST HOLE NUMBER: 35

LOCATION: 096N-51W-06BCBC

LEGAL LOCATION: SW NW SW NW sec. 06, T. 096 N., R. 51 W.

0 - 1 Sand and gravel (roadfill)
5 - 40 Sand, reddish-brown, fine to medium, clayey; oxidized, moist
40 - 45 Sand and gravel, reddish-brown, coarse sand, fine gravel; oxidized, saturated; hit large rocks at 45 feet, abandoned hole

TEST HOLE NUMBER: 36

LOCATION: 096N-51W-24BCBB

LEGAL LOCATION: NW NW SW NW sec. 24, T. 096 N., R. 51 W.

25 - 51 Sand, light-brown, fine to very fine, silty; oxidized, saturated

TEST HOLE NUMBER: 37

LOCATION: 097N-48W-06ABBB

LEGAL LOCATION: NW NW NW NE sec. 06, T. 097 N., R. 48 W.

9 - 17 Sand and gravel, coarse sand to fine pebble gravel; mostly igneous and sedimentary rock fragments, few quartz grains, few pebbles; hit rock, abandoned hole

TEST HOLE NUMBER: 38

LOCATION: 097N-48W-06BAAA 1

LEGAL LOCATION: NE NE NE NW sec. 06, T. 097 N., R. 48 W.

12 - 15 Gravel, rusty-brown, silty; oxidized, dry

TEST HOLE NUMBER: 39

LOCATION: 097N-48W-06BAAA 2

LEGAL LOCATION: NE NE NE NW sec. 06, T. 097 N., R. 48 W.

12 - 15 Gravel, rusty-brown, silty; oxidized, dry

TEST HOLE NUMBER: 40

LOCATION: 097N-48W-14BDBC 1

LEGAL LOCATION: SW NW SE NW sec. 14, T. 097 N., R. 48 W.

19 - 22 Gravel, reddish-brown, coarse

24 - 26 Gravel, reddish-brown, coarse

34 - 36 Gravel, reddish-brown, coarse

TEST HOLE NUMBER: 41

LOCATION: 097N-48W-14BDBC 2

LEGAL LOCATION: SW NW SE NW sec. 14, T. 097 N., R. 48 W.

19 - 22 Gravel, reddish-brown, coarse

24 - 26 Gravel, reddish-brown, coarse

TEST HOLE NUMBER: 42

LOCATION: 097N-48W-14BDCA 1

LEGAL LOCATION: NE SW SE NW sec. 14, T. 097 N., R. 48 W.

6 - 30 Sand and gravel

30 - 40 Sand, green-gray, very coarse

40 - 41 Sand, gray, very fine

TEST HOLE NUMBER: 43

LOCATION: 097N-48W-14BDCA 2

LEGAL LOCATION: NE SW SE NW sec. 14, T. 097 N., R. 48 W.

6 - 26 Sand and gravel

TEST HOLE NUMBER: 44

LOCATION: 097N-48W-14BDCA 3

LEGAL LOCATION: NE SW SE NW sec. 14, T. 097 N., R. 48 W.

6 - 30 Sand and gravel

30 - 36 Sand, green, very coarse

TEST HOLE NUMBER: 45

LOCATION: 097N-48W-14BDDB 1

LEGAL LOCATION: NW SE SE NW sec. 14, T. 097 N., R. 48 W.

20 - 25 Gravel, reddish-brown, coarse to fine; some sand

31 - 34 Gravel, reddish-brown, coarse to fine

36 - 38 Gravel, reddish-brown, coarse to fine

TEST HOLE NUMBER: 46
LOCATION: 097N-48W-14BDDDB 2
LEGAL LOCATION: NW SE SE NW sec. 14, T. 097 N., R. 48 W.

20 - 25 Gravel, reddish-brown, coarse to fine; some sand
31 - 34 Gravel, reddish-brown, coarse to fine
36 - 38 Gravel, reddish-brown, coarse to fine

TEST HOLE NUMBER: 47
LOCATION: 097N-48W-14CACA
LEGAL LOCATION: NE SW NE SW sec. 14, T. 097 N., R. 48 W.

7 - 11 Gravel, reddish-brown, coarse
18 - 32 Sand, gray, silty; some clay stringers

TEST HOLE NUMBER: 48
LOCATION: 097N-48W-14CADC 1
LEGAL LOCATION: SW SE NE SW sec. 14, T. 097 N., R. 48 W.

0 - 6 Gravel, red-brown, coarse, grading to sand
9 - 13 Gravel, red-brown, coarse, grading to sand

TEST HOLE NUMBER: 49
LOCATION: 097N-48W-14CADC 2
LEGAL LOCATION: SW SE NE SW sec. 14, T. 097 N., R. 48 W.

0 - 6 Sand, light-brown, very fine
6 - 12 Sand and gravel, medium to coarse
12 - 14 Sand, blue-gray, very fine, well sorted

TEST HOLE NUMBER: 50
LOCATION: 097N-48W-14CBAB
LEGAL LOCATION: NW NE NW SW sec. 14, T. 097 N., R. 48 W.

7 - 39 Gravel, reddish-brown, medium to coarse; some cobbles

TEST HOLE NUMBER: 51
LOCATION: 097N-48W-14CBBC
LEGAL LOCATION: SW NW NW SW sec. 14, T. 097 N., R. 48 W.

5 - 25 Gravel, reddish-brown, coarse to fine; some sand
33 - 36 Gravel, reddish-brown, coarse to fine

TEST HOLE NUMBER: 52
LOCATION: 097N-48W-14CBCB
LEGAL LOCATION: NW SW NW SW sec. 14, T. 097 N., R. 48 W.

4 - 40 Gravel, reddish-brown, coarse

TEST HOLE NUMBER: 53
LOCATION: 097N-48W-14CDAA

LEGAL LOCATION: NE NE SE SW sec. 14, T. 097 N., R. 48 W.

5 - 10 Sand, brown, medium; saturated
10 - 50 Gravel, reddish-brown, fine to coarse, sandy

TEST HOLE NUMBER: 54

LOCATION: 097N-48W-14CDAD

LEGAL LOCATION: SE NE SE SW sec. 14, T. 097 N., R. 48 W.

10 - 15 Sand, light-brown, silty; some gravel
27 - 38 Sand, greenish-brown, fine, silty, clayey; saturated
38 - 45 Sand, greenish-brown, coarse

TEST HOLE NUMBER: 55

LOCATION: 097N-48W-14CDCC

LEGAL LOCATION: SW SW SE SW sec. 14, T. 097 N., R. 48 W.

4 - 37 Gravel, reddish-brown, coarse, grading to sand

TEST HOLE NUMBER: 56

LOCATION: 097N-48W-14DCCB

LEGAL LOCATION: NW SW SW SE sec. 14, T. 097 N., R. 48 W.

5 - 10 Gravel, reddish-brown, coarse; some sand
10 - 16 Sand, greenish-brown, medium; dry
16 - 34 Sand, greenish-brown, medium grading to coarse; saturated
34 - 48 Gravel, brown, fine, sandy; saturated

TEST HOLE NUMBER: 57

LOCATION: 097N-48W-15ACDB

LEGAL LOCATION: NW SE SW NE sec. 15, T. 097 N., R. 48 W.

5 - 7 Gravel, reddish-brown, coarse to fine
14 - 16 Gravel, reddish-brown, coarse to fine

TEST HOLE NUMBER: 58

LOCATION: 097N-48W-15ACDD 1

LEGAL LOCATION: SE SE SW NE sec. 15, T. 097 N., R. 48 W.

1 - 18 Sand, medium to fine, silty
18 - 23 Gravel, reddish-brown, coarse to fine
24 - 36 Gravel, reddish-brown, very coarse, grading to sand

TEST HOLE NUMBER: 59

LOCATION: 097N-48W-15ACDD 2

LEGAL LOCATION: SE SE SW NE sec. 15, T. 097 N., R. 48 W.

1 - 18 Sand, medium to fine, silty
18 - 23 Gravel, reddish-brown, coarse to fine
24 - 36 Gravel, reddish-brown, very coarse, grading to sand

TEST HOLE NUMBER: 60

LOCATION: 097N-48W-23ABAD

LEGAL LOCATION: SE NE NW NE sec. 23, T. 097 N., R. 48 W.

15 - 17 Gravel, reddish-brown, medium

TEST HOLE NUMBER: 61

LOCATION: 097N-48W-23ABBB

LEGAL LOCATION: NW NW NW NE sec. 23, T. 097 N., R. 48 W.

1 - 5 Gravel, reddish-brown, coarse, grading to sand; dry
10 - 16 Sand, light-brown, fine, grading to medium; moist
18 - 50 Sand, light-brown, fine, grading to fine gravel, clayey; saturated

TEST HOLE NUMBER: 62

LOCATION: 097N-48W-23ABBC

LEGAL LOCATION: SW NW NW NE sec. 23, T. 097 N., R. 48 W.

0 - 8 Gravel, reddish-brown, coarse, grading to sand
35 - 55 Sand, gray, fine, grading to coarse, silty, some clay; saturated

TEST HOLE NUMBER: 63

LOCATION: 097N-48W-23ABCA

LEGAL LOCATION: NE SW NW NE sec. 23, T. 097 N., R. 48 W.

19 - 20 Sand, white, medium; clean, noncalcareous
34 - 35 Sand, white; soft, noncalcareous

TEST HOLE NUMBER: 64

LOCATION: 097N-48W-23ACDB

LEGAL LOCATION: NW SE SW NE sec. 23, T. 097 N., R. 48 W.

2 - 13 Sand and gravel

TEST HOLE NUMBER: 65

LOCATION: 097N-48W-23BCCB

LEGAL LOCATION: NW SW SW NW sec. 23, T. 097 N., R. 48 W.

24 - 45 Sand and gravel, reddish-brown, coarse sand, fine to medium gravel, clayey at 36 to 45 feet; oxidized, dry; clean

TEST HOLE NUMBER: 66

LOCATION: 097N-48W-23CCDD

LEGAL LOCATION: SE SE SW SW sec. 23, T. 097 N., R. 48 W.

7 - 10 Sand, medium
10 - 43 Sand and gravel, medium to coarse

TEST HOLE NUMBER: 67

LOCATION: 097N-48W-26AABB 1

LEGAL LOCATION: NW NW NE NE sec. 26, T. 097 N., R. 48 W.

2 - 16 Sand and gravel, reddish-brown
16 - 20 Sand and gravel, yellow-brown

TEST HOLE NUMBER: 68
LOCATION: 097N-48W-26AABB 2
LEGAL LOCATION: NW NW NE NE sec. 26, T. 097 N., R. 48 W.

2 - 16 Sand and gravel, rusty-brown in color
16 - 20 Sand and gravel, yellow-brown

TEST HOLE NUMBER: 69
LOCATION: 097N-48W-36CCAB
LEGAL LOCATION: NW NE SW SW sec. 36, T. 097 N., R. 48 W.

17 - 23 Gravel, brown, coarse, very sandy

TEST HOLE NUMBER: 70
LOCATION: 097N-48W-36CCBC
LEGAL LOCATION: SW NW SW SW sec. 36, T. 097 N., R. 48 W.

18 - 20 Gravel, coarse
20 - 40 Sand, coarse

TEST HOLE NUMBER: 71
LOCATION: 097N-49W-04ABAB
LEGAL LOCATION: NW NE NW NE sec. 04, T. 097 N., R. 49 W.

20 - 30 Sand, white, medium, medium to well-rounded; clean, mostly quartz and feldspar, some black specks (western sand)
30 - 92 Gravel, orange-white, fine, very sandy, subrounded; few soft rock clasts (western sand)

TEST HOLE NUMBER: 72
LOCATION: 097N-49W-23ADDA
LEGAL LOCATION: NE SE SE NE sec. 23, T. 097 N., R. 49 W.

13 - 18 Gravel, medium to coarse

TEST HOLE NUMBER: 73
LOCATION: 097N-49W-27AABB
LEGAL LOCATION: NW NW NE NE sec. 27, T. 097 N., R. 49 W.

6 - 10 Sand and gravel, brown, coarse sand, medium to coarse gravel, clayey; oxidized

TEST HOLE NUMBER: 74
LOCATION: 097N-50W-17DDCD
LEGAL LOCATION: SE SW SE SE sec. 17, T. 097 N., R. 50 W.

22 - 40 Sand, gray, sandy, pebbly (outwash)

TEST HOLE NUMBER: 75
LOCATION: 097N-51W-05AAAD
LEGAL LOCATION: SE NE NE NE sec. 05, T. 097 N., R. 51 W.

1 - 4 Gravel, medium to coarse

TEST HOLE NUMBER: 76
LOCATION: 097N-51W-17CDDC
LEGAL LOCATION: SW SE SE SW sec. 17, T. 097 N., R. 51 W.

0 - 1 Sand, reddish-brown, medium; oxidized, dry
1 - 15 Sand, reddish-brown, medium; oxidized, saturated
15 - 29 Sand, gray, medium; unoxidized, saturated

TEST HOLE NUMBER: 77
LOCATION: 097N-51W-18CCCC
LEGAL LOCATION: SW SW SW SW sec. 18, T. 097 N., R. 51 W.

10 - 37 Gravel, fine; gravel is 1/8 to 1/4 inch in diameter, also coarse to very coarse sand

TEST HOLE NUMBER: 78
LOCATION: 097N-51W-19BAAA
LEGAL LOCATION: NE NE NE NW sec. 19, T. 097 N., R. 51 W.

0 - 8 Sand, yellow-brown, fine; limestone fragments appear and probably are road aggregate
8 - 25 Sand, yellow-brown, very coarse; some fine gravel
25 - 30 Sand, gray, very coarse; some small gravel

TEST HOLE NUMBER: 79
LOCATION: 097N-51W-19BBBB 1
LEGAL LOCATION: NW NW NW NW sec. 19, T. 097 N., R. 51 W.

9 - 37 Gravel, fine; with very coarse sand

TEST HOLE NUMBER: 80
LOCATION: 097N-51W-19BBBB 2
LEGAL LOCATION: NW NW NW NW sec. 19, T. 097 N., R. 51 W.

10 - 41 Sand, gray, very coarse; with some fine gravel

TEST HOLE NUMBER: 81
LOCATION: 097N-51W-19CBBB
LEGAL LOCATION: NW NW NW SW sec. 19, T. 097 N., R. 51 W.

14 - 43 Sand, very coarse; some 1/4 inch gravel

TEST HOLE NUMBER: 82
LOCATION: 097N-51W-19CCCC
LEGAL LOCATION: SW SW SW SW sec. 19, T. 097 N., R. 51 W.

2 - 9 Sand, brown, fine to coarse
18 - 49 Sand, very coarse; some fine gravel

TEST HOLE NUMBER: 83
LOCATION: 097N-51W-29CBBB
LEGAL LOCATION: NW NW NW SW sec. 29, T. 097 N., R. 51 W.

1 - 14 Sand, brown, fine to medium, slightly clayey; oxidized
14 - 22 Sand, brown, fine to medium, slightly clayey; oxidized, moist

22 - 46 Sand, brown, fine to medium, slightly clayey; oxidized, saturated

TEST HOLE NUMBER: 84
LOCATION: 097N-51W-30AAAA
LEGAL LOCATION: NE NE NE NE sec. 30, T. 097 N., R. 51 W.

8 - 26 Sand, dark-brown, fine, very silty, poorly sorted; saturated
26 - 35 Gravel, dark-brown, fine to medium, very silty, poorly sorted; saturated

TEST HOLE NUMBER: 85
LOCATION: 097N-51W-30BBAA
LEGAL LOCATION: NE NE NW NW sec. 30, T. 097 N., R. 51 W.

15 - 37 Gravel, medium, clayey, poorly sorted; saturated, unoxidized

TEST HOLE NUMBER: 86
LOCATION: 097N-51W-30CCCC
LEGAL LOCATION: SW SW SW SW sec. 30, T. 097 N., R. 51 W.

14 - 16 Sand, medium to fine
16 - 43 Gravel, fine; with very coarse sand

TEST HOLE NUMBER: 87
LOCATION: 097N-51W-30CDDD
LEGAL LOCATION: SE SE SE SW sec. 30, T. 097 N., R. 51 W.

15 - 52 Gravel; with medium to very coarse sand

TEST HOLE NUMBER: 88
LOCATION: 097N-51W-31BAAA
LEGAL LOCATION: NE NE NE NW sec. 31, T. 097 N., R. 51 W.

7 - 12 Sand, brown, fine, very clayey, poorly sorted; saturated, oxidized
12 - 46 Gravel, brown, medium to coarse, clayey; saturated, unoxidized, with coarse sand

TEST HOLE NUMBER: 89
LOCATION: 098N-48W-05BBBB
LEGAL LOCATION: NW NW NW SW sec. 05, T. 098 N., R. 48 W.

6 - 23 Sand, brown, medium to fine; oxidized, saturated; fairly clean
23 - 43 Sand, gray, medium to fine; fairly clean

TEST HOLE NUMBER: 90
LOCATION: 098N-48W-08ABAA
LEGAL LOCATION: NE NE NW NE sec. 08, T. 098 N., R. 48 W.

8 - 26 Sand

TEST HOLE NUMBER: 91
LOCATION: 098N-48W-08CDDD

LEGAL LOCATION: SE SE SE SW sec. 08, T. 098 N., R. 48 W.

24 - 28 Gravel; could not penetrate

TEST HOLE NUMBER: 92

LOCATION: 098N-48W-08DACA

LEGAL LOCATION: NE SW NE SE sec. 08, T. 098 N., R. 48 W.

3 - 20 Gravel, rusty-brown, coarse to fine, silty, sandy; oxidized, dry

TEST HOLE NUMBER: 93

LOCATION: 098N-48W-17DDBC

LEGAL LOCATION: SW NW SE SE sec. 17, T. 098 N., R. 48 W.

10 - 20 Sand, medium

TEST HOLE NUMBER: 94

LOCATION: 098N-48W-17DDCB 1

LEGAL LOCATION: NW SW SE SE sec. 17, T. 098 N., R. 48 W.

10 - 22 Sand and gravel, fine sand to medium gravel

TEST HOLE NUMBER: 95

LOCATION: 098N-48W-17DDCB 2

LEGAL LOCATION: NW SW SE SE sec. 17, T. 098 N., R. 48 W.

12 - 18 Sand and gravel, medium sand to coarse gravel

TEST HOLE NUMBER: 96

LOCATION: 098N-48W-18CCCC

LEGAL LOCATION: SW SW SW SW sec. 18, T. 098 N., R. 48 W.

1 - 11 Gravel and sand
11 - 45 Sand, fine to medium, gravelly

TEST HOLE NUMBER: 97

LOCATION: 098N-48W-19AAAD

LEGAL LOCATION: SE NE NE NE sec. 19, T. 098 N., R. 48 W.

3 - 6 Gravel, brown, silty; oxidized, dry

TEST HOLE NUMBER: 98

LOCATION: 098N-48W-19ABBB

LEGAL LOCATION: NW NW NW NE sec. 19, T. 098 N., R. 48 W.

4 - 18 Sand, medium

TEST HOLE NUMBER: 99

LOCATION: 098N-48W-19ABBB 2

LEGAL LOCATION: NW NW NW NE sec. 19, T. 098 N., R. 48 W.

4 - 18 Gravel, medium to coarse, sandy, subangular, some sedimentary fragments

TEST HOLE NUMBER: 100
LOCATION: 098N-48W-19ADDA
LEGAL LOCATION: NE SE SE NE sec. 19, T. 098 N., R. 48 W.

0	-	4	Sand, blackish-brown to dark-brown, fine (alluvium)
4	-	9	Sand, blackish-yellow-brown, fine; some gravel
9	-	14	Sand, blackish-yellow-brown, fine; some gravel, saturated
14	-	19	Sand and gravel, fine to coarse sand
19	-	29	Sand and gravel, yellowish-brown, coarse sand; saturated
29	-	34	Sand, yellowish-brown, fine to coarse; saturated
34	-	39	Sand, fine to coarse; some gravel; saturated

TEST HOLE NUMBER: 101
LOCATION: 098N-48W-19ADDD
LEGAL LOCATION: SE SE SE NE sec. 19, T. 098 N., R. 48 W.

3	-	9	Sand, brown, fine, slightly clayey; oxidized, moist
9	-	19	Sand, dark-brown, fine, slightly clayey; oxidized, saturated

TEST HOLE NUMBER: 102
LOCATION: 098N-48W-20BABA 1
LEGAL LOCATION: NE NW NE NW sec. 20, T. 098 N., R. 48 W.

0	-	3	Sand, brown, fine, clayey; oxidized, dry
3	-	6	Sand, reddish-brown, fine, clayey; oxidized, dry
6	-	15	Gravel, brown, silty, clayey; oxidized, dry; hit rock at 15 feet, abandoned hole

TEST HOLE NUMBER: 103
LOCATION: 098N-48W-20BABA 2
LEGAL LOCATION: NE NW NE NW sec. 20, T. 098 N., R. 48 W.

0	-	6	Sand, reddish-brown, fine, clayey; oxidized, dry
6	-	14	Gravel, brown, cobble size, clayey, sandy; oxidized, dry; could not penetrate below 14 feet, abandoned hole

TEST HOLE NUMBER: 104
LOCATION: 098N-48W-31DCDC
LEGAL LOCATION: SW SE SW SE sec. 31, T. 098 N., R. 48 W.

2	-	7	Sand, yellow, fine (loess)
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TEST HOLE NUMBER: 105
LOCATION: 098N-49W-05AAAA
LEGAL LOCATION: NE NE NE NE sec. 05, T. 098 N., R. 49 W.

20	-	24	Sand
27	-	32	Sand

TEST HOLE NUMBER: 106
LOCATION: 098N-49W-05ADAD
LEGAL LOCATION: SE NE SE NE sec. 0, MT. 098 N., R. 49 W.

15	-	17	Sand, reddish-brown, coarse, slightly clayey, gravelly; oxidized, moist
17	-	26	Gravel, reddish-brown, medium; oxidized, saturated; clean

TEST HOLE NUMBER: 107
LOCATION: 098N-49W-05BABA
LEGAL LOCATION: NE NW NE NW sec. 05, T. 098 N., R. 49 W.

11 - 17 Sand and gravel, dark-brown, coarse sand, fine to medium gravel, slightly clayey; oxidized, dry

TEST HOLE NUMBER: 108
LOCATION: 098N-49W-05DAAD
LEGAL LOCATION: SE NE NE SE sec. 05, T. 098 N., R. 49 W.

22 - 29 Sand, brown, fine to medium, very clayey; oxidized, saturated

TEST HOLE NUMBER: 109
LOCATION: 098N-49W-05DDAA
LEGAL LOCATION: NE NE SE SE sec. 05, T. 098 N., R. 49 W.

13 - 30 Sand, gray, fine

TEST HOLE NUMBER: 110
LOCATION: 098N-49W-06CBBB
LEGAL LOCATION: NW NW NW SW sec. 06, T. 098 N., R. 49 W.

10 - 58 Sand, brown, medium to coarse, clayey; oxidized, saturated

TEST HOLE NUMBER: 111
LOCATION: 098N-49W-10BBAA
LEGAL LOCATION: NE NE NW NW sec. 10, T. 098 N., R. 49 W.

20 - 30 Sand, brown, medium to fine; 25 percent clay
30 - 45 Sand, brown, fine to coarse; 25 percent clay; saturated

TEST HOLE NUMBER: 112
LOCATION: 098N-49W-10DDCC
LEGAL LOCATION: SW SW SE SE sec. 10, T. 098 N., R. 49 W.

0 - 8 Gravel, reddish-brown, clayey; oxidized, dry

TEST HOLE NUMBER: 113
LOCATION: 098N-49W-15DDDA
LEGAL LOCATION: NE SE SE SE sec. 15, T. 098 N., R. 49 W.

17 - 34 Sand, brown, medium; 25 percent clay
34 - 40 Sand, gray; 50 percent clay

TEST HOLE NUMBER: 114
LOCATION: 098N-49W-16ABAB
LEGAL LOCATION: NW NE NW NE sec. 16, T. 098 N., R. 49 W.

17 - 27 Sand, brown, fine to very fine; 25 percent clay
27 - 31 Sand, brown, fine to medium; 10 percent clay
33 - 50 Sand, brown, fine to medium; 25 percent clay

TEST HOLE NUMBER: 115
LOCATION: 098N-49W-18CCCC
LEGAL LOCATION: SW SW SW SW sec. 18, T. 098 N., R. 49 W.

0	-	4	Sand, fine, silty; to loam
4	-	14	Sand, brownish-yellow; very dry
14	-	19	Gravel, yellowish-brown; with sand intermixed
19	-	24	Sand, brownish-gray to yellow-gray, gravelly; hit water at 22 feet
24	-	39	Gravel and sand, brownish-gray to yellow-gray

TEST HOLE NUMBER: 116
LOCATION: 098N-49W-19AADD
LEGAL LOCATION: SE SE NE NE sec. 19, T. 098 N., R. 49 W.

2	-	30	Gravel, medium-grained, subrounded; large rocks near base
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TEST HOLE NUMBER: 117
LOCATION: 098N-49W-19BBBB
LEGAL LOCATION: NW NW NW NW sec. 19, T. 098 N., R. 49 W.

24	-	40	Sand
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TEST HOLE NUMBER: 118
LOCATION: 098N-49W-22CDDD
LEGAL LOCATION: SE SE SE SW sec. 22, T. 098 N., R. 49 W.

3	-	22	Gravel
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TEST HOLE NUMBER: 119
LOCATION: 098N-49W-22DCCC
LEGAL LOCATION: SW SW SW SE sec. 22, T. 098 N., R. 49 W.

25	-	30	Sand, black, fine to medium; 25 percent clay; saturated
30	-	42	Sand, gray, fine to coarse, clayey; saturated

TEST HOLE NUMBER: 120
LOCATION: 098N-49W-22DDDD
LEGAL LOCATION: SE SE SE SE sec. 22, T. 098 N., R. 49 W.

8	-	19	Sand; with gravel
19	-	30	Gravel, medium to fine, poorly sorted

TEST HOLE NUMBER: 121
LOCATION: 098N-49W-23AACC
LEGAL LOCATION: SW SW NE NE sec. 23, T. 098 N., R. 49 W.

0	-	19	Sand, dark-brown, fine; to colluvium
19	-	34	Sand, yellowish-brown, fine; with gravel intermixed, saturated; 70 percent sand
34	-	39	Gravel; with fine to coarse sand; 60 percent gravel
39	-	54	Sand, grayish, fine; with clay like material; 70 percent sand

TEST HOLE NUMBER: 122
LOCATION: 098N-49W-23AD

LEGAL LOCATION: SE NE sec. 23, T. 098 N., R. 49 W.

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5	-	15	Sand, medium to fine
15	-	20	Sand, fine
20	-	28	Sand, fine to medium
40	-	44	Sand and clay, sandy clay

TEST HOLE NUMBER: 123

LOCATION: 098N-49W-23ADAA

LEGAL LOCATION: NE NE SE NE sec. 23, T. 098 N., R. 49 W.

13	-	14	Sand, fine, silty
14	-	21	Sand, brown, coarse to fine, silty; wet, some clay
21	-	24	Sand and gravel, fine gravel; wet
24	-	29	Gravel, fine to medium, subangular to subrounded; saturated
34	-	44	Sand and gravel, fine to coarse gravel, clayey

TEST HOLE NUMBER: 124

LOCATION: 098N-49W-23ADAC

LEGAL LOCATION: SW NE SE NE sec. 23, T. 098 N., R. 49 W.

10	-	20	Sand and gravel, dirty-black, medium to coarse sand, fine to medium gravel; completely saturated
20	-	35	Gravel, dirty-black, fine to medium, angular; some coarse gravel, saturated

TEST HOLE NUMBER: 125

LOCATION: 098N-49W-23ADDB

LEGAL LOCATION: NW SE SE NE sec. 23, T. 098 N., R. 49 W.

4	-	9	Sand, pebbly; dirty, oxidized, dry
9	-	14	Sand, clayey, pebbly; oxidized, moist
14	-	19	Sand, clayey, gravelly; oxidized, moisture increasing
19	-	29	Gravel, brown-gray, pebble-size, sandy; moist
29	-	34	Gravel, pebble-size, clayey, sandy; unoxidized, moist

TEST HOLE NUMBER: 126

LOCATION: 098N-49W-23ADDC

LEGAL LOCATION: SW SE SE NE sec. 23, T. 098 N., R. 49 W.

7	-	29	Sand, fine to coarse, silty
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TEST HOLE NUMBER: 127

LOCATION: 098N-49W-23ADDD

LEGAL LOCATION: SE SE SE NE sec. 23, T. 098 N., R. 49 W.

7	-	29	Sand, fine to coarse, slightly silty
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TEST HOLE NUMBER: 128

LOCATION: 098N-49W-23BABD

LEGAL LOCATION: SE NW NE NW sec. 23, T. 098 N., R. 49 W.

1 - 22 Sand, brown; dirty
22 - 50 Sand, blue, fine

TEST HOLE NUMBER: 129

LOCATION: 098N-49W-23DAAD

LEGAL LOCATION: SE NE NE SE sec. 23, T. 098 N., R. 49 W.

1 - 10 Sand, fine to coarse

TEST HOLE NUMBER: 130

LOCATION: 098N-49W-23DADA

LEGAL LOCATION: NE SE NE SE sec. 23, T. 098 N., R. 49 W.

8 - 24 Sand, fine to coarse at the top grading to fine to medium at the bottom

TEST HOLE NUMBER: 131

LOCATION: 098N-49W-23DADA 1

LEGAL LOCATION: NE SE NE SE sec. 23, T. 098 N., R. 49 W.

0 - 5 Sand, black, fine, silty
5 - 25 Sand, black, fine, grading to medium
25 - 46 Sand, medium; with some gray clay

TEST HOLE NUMBER: 132

LOCATION: 098N-49W-23DADB

LEGAL LOCATION: NW SE NE SE sec. 23, T. 098 N., R. 49 W.

11 - 25 Sand and gravel, medium to coarse sand, fine gravel
25 - 27 Sand, medium to coarse; with a little gray clay
27 - 39 Sand and gravel, medium to coarse sand, fine gravel; with much gray clay

TEST HOLE NUMBER: 133

LOCATION: 098N-49W-23DADC

LEGAL LOCATION: SW SE NE SE sec. 23, T. 098 N., R. 49 W.

11 - 39 Sand and gravel, medium to coarse sand, fine gravel; change from oxidized to unoxidized at about 25 feet

TEST HOLE NUMBER: 134

LOCATION: 098N-49W-23DADD

LEGAL LOCATION: SE SE NE SE sec. 23, T. 098 N., R. 49 W.

0 - 42 Sand, fine to coarse, silty

TEST HOLE NUMBER: 135

LOCATION: 098N-49W-23DBDC

LEGAL LOCATION: SW SE NW SE sec. 23, T. 098 N., R. 49 W.

0 - 26 Sand and gravel, brown, fine to coarse sand, fine to coarse gravel; Big Sioux River terrace

TEST HOLE NUMBER: 136
LOCATION: 098N-49W-23DCCC
LEGAL LOCATION: SW SW SW SE sec. 23, T. 098 N., R. 49 W.

7 - 9 Sand, medium

TEST HOLE NUMBER: 137
LOCATION: 098N-49W-23DDAA
LEGAL LOCATION: NE NE SE SE sec. 23, T. 098 N., R. 49 W.

0 - 4 Sand, yellowish-brown, clayey; oxidized, moist
4 - 9 Sand, coarse, pebbly; tough at 8 feet
9 - 19 Gravel; dirty, dry; few rocks
19 - 24 Sand, brown-gray, clayey; oxidized, wet
24 - 34 Sand, brownish-gray, clayey, pebbly; wet

TEST HOLE NUMBER: 138
LOCATION: 098N-49W-24AAAA
LEGAL LOCATION: NE NE NE NE sec. 24, T. 098 N., R. 49 W.

3 - 21 Sand, medium to coarse

TEST HOLE NUMBER: 139
LOCATION: 098N-49W-24BBDB
LEGAL LOCATION: NW SE NW NW sec. 24, T. 098 N., R. 49 W.

4 - 22 Sand, brown

TEST HOLE NUMBER: 140
LOCATION: 098N-49W-24CB
LEGAL LOCATION: NW SW sec. 24, T. 098 N., R. 49 W.

* THIS LOG CONTAINS UNVERIFIED INFORMATION *

0 - 22 Sand and gravel
22 - 30 Sand, fine to medium

TEST HOLE NUMBER: 141
LOCATION: 098N-49W-24CBBC
LEGAL LOCATION: SW NW NW SW sec. 24, T. 098 N., R. 49 W.

0 - 2 Sand, brown, silty
2 - 7 Sand, medium to coarse, clayey
7 - 27 Sand, medium to coarse, gravelly; pea-size gravel
27 - 40 Sand, coarse; 15 percent clay
40 - 45 Sand, gray, fine to medium; 25 percent clay

TEST HOLE NUMBER: 142
LOCATION: 098N-49W-24CBBC 1
LEGAL LOCATION: SW NW NW SW sec. 24, T. 098 N., R. 49 W.

2 - 7 Sand, fine to coarse

TEST HOLE NUMBER: 143
LOCATION: 098N-49W-25BA
LEGAL LOCATION: NE NW sec. 25, T. 098 N., R. 49 W.

- 4 - 6 Sand, brown, fine to medium
- 9 - 14 Sand, fine to medium
- 14 - 25 Sand, fine to coarse, clayey

TEST HOLE NUMBER: 144
LOCATION: 098N-49W-25BDAC
LEGAL LOCATION: SW NE SE NW sec. 25, T. 098 N., R. 49 W.

- 18 - 22 Sand, medium, silty

TEST HOLE NUMBER: 145
LOCATION: 098N-49W-25CCBC
LEGAL LOCATION: SW NW SW SW sec. 25, T. 098 N., R. 49 W.

- 10 - 22 Gravel, coarse, pea-size and bigger

TEST HOLE NUMBER: 146
LOCATION: 098N-49W-26BDDD
LEGAL LOCATION: SE SE SE NW sec. 26, T. 098 N., R. 49 W.

- 2 - 12 Sand, tan-brown, medium to coarse, slightly clayey; oxidized, saturated
- 12 - 22 Gravel, tan-brown, medium, clayey, sandy; oxidized, saturated
- 22 - 35 Gravel, gray, medium, sandy; unoxidized, saturated
- 35 - 52 Gravel, gray, medium, very clayey, sandy; unoxidized, saturated; hit rock at 52 feet; abandoned hole

TEST HOLE NUMBER: 147
LOCATION: 098N-49W-26CDDD
LEGAL LOCATION: SE SE SE SW sec. 26, T. 098 N., R. 49 W.

- 7 - 20 Gravel, fine to medium, sandy (outwash)

TEST HOLE NUMBER: 148
LOCATION: 098N-49W-26CDDD 2
LEGAL LOCATION: SE SE SE SW sec. 26, T. 098 N., R. 49 W.

- 12 - 22 Sand and gravel, fine sand to fine pebble gravel, clayey; mostly igneous and sedimentary rock fragments with a moderate amount of subangular quartz

TEST HOLE NUMBER: 149
LOCATION: 098N-49W-26DDAD
LEGAL LOCATION: SE NE SE SE sec. 26, T. 098 N., R. 49 W.

- 18 - 26 Sand and gravel, brown, coarse sand, fine gravel, clayey
- 26 - 31 Sand and clay, gray, medium to very fine sand
- 31 - 47 Sand and clay, gray, fine to very fine sand

TEST HOLE NUMBER: 150
LOCATION: 098N-49W-28ADDD

LEGAL LOCATION: SE SE SE NE sec. 28, T. 098 N., R. 49 W.

12 - 23 Sand, gray, fine to medium; unoxidized, saturated

TEST HOLE NUMBER: 151

LOCATION: 098N-49W-28CBBC

LEGAL LOCATION: SW NW NW SW sec. 28, T. 098 N., R. 49 W.

0 - 20 Sand, rusty-brown, very fine; clean, dry, oxidized

TEST HOLE NUMBER: 152

LOCATION: 098N-49W-29ADDD

LEGAL LOCATION: SE SE SE NE sec. 29, T. 098 N., R. 49 W.

0 - 3 Sand

3 - 14 Sand and gravel

TEST HOLE NUMBER: 153

LOCATION: 098N-49W-29BBCB

LEGAL LOCATION: NW SW NW NW sec. 29, T. 098 N., R. 49 W.

24 - 33 Gravel, dark-gray, clayey; unoxidized, saturated; driller reports clay at 33 feet; no return

TEST HOLE NUMBER: 154

LOCATION: 098N-49W-29BCBB

LEGAL LOCATION: NW NW SW NW sec. 29, T. 098 N., R. 49 W.

1 - 6 Gravel

6 - 30 Sand, medium to fine, gravelly; medium gravel, 20 percent clay

TEST HOLE NUMBER: 155

LOCATION: 098N-49W-30ADDD

LEGAL LOCATION: SE SE SE NE sec. 30, T. 098 N., R. 49 W.

0 - 20 Sand and gravel, brown, medium to coarse sand, fine to medium gravel, slightly clayey; oxidized, moist at 14 feet

TEST HOLE NUMBER: 156

LOCATION: 098N-49W-30CCCB

LEGAL LOCATION: NW SW ~r SW SW sec. 30, T. 098 N., R. 49 W.

12 - 35 Gravel

TEST HOLE NUMBER: 157

LOCATION: 098N-49W-34ADAD

LEGAL LOCATION: SE NE SE NE sec. 34, T. 098 N., R. 49 W.

18 - 30 Sand, dark-gray, fine to medium, very clayey; moist; driller reports clay at 30 feet, drilled hard, no return

TEST HOLE NUMBER: 158

LOCATION: 098N-49W-35ADAD

LEGAL LOCATION: SE NE SE NE sec. 35, T. 098 N., R. 49 W.

5 - 10 Sand, medium to coarse; with clay
38 - 40 Sand, medium to coarse

TEST HOLE NUMBER: 159

LOCATION: 098N-49W-36CCCC 1

LEGAL LOCATION: SW SW SW SW sec. 36, T. 098 N., R. 49 W.

8 - 10 Sand, fine
10 - 80 Gravel, fine to medium; interbedded with till

TEST HOLE NUMBER: 160

LOCATION: 098N-49W-36CCCC 2

LEGAL LOCATION: SW SW SW SW sec. 36, T. 098 N., R. 49 W.

8 - 10 Sand, fine
10 - 80 Gravel, fine to medium; interbedded with till

TEST HOLE NUMBER: 161

LOCATION: 098N-49W-36CCCC 4

LEGAL LOCATION: SW SW SW SW sec. 36, T. 098 N., R. 49 W.

0 - 3 Sand and gravel

TEST HOLE NUMBER: 162

LOCATION: 098N-50W-01BBBB

LEGAL LOCATION: NW NW NW NW sec. 01, T. 098 N., R. 50 W.

21 - 41 Sand and gravel, fine sand to coarse gravel; with clay layers

TEST HOLE NUMBER: 163

LOCATION: 098N-50W-02ADAA

LEGAL LOCATION: NE NE SE NE sec. 02, T. 098 N., R. 50 W.

7 - 25 Sand, reddish-brown, fine to medium; oxidized, saturated

TEST HOLE NUMBER: 164

LOCATION: 098N-50W-24AAAA

LEGAL LOCATION: NE NE NE NE sec. 24, T. 098 N., R. 50 W.

20 - 32 Sand, fine

TEST HOLE NUMBER: 165

LOCATION: 098N-50W-25CDDC

LEGAL LOCATION: SE SW SE SW sec. 25, T. 098 N., R. 50 W.

22 - 38 Sand, brown, very fine, very clayey; oxidized, saturated
38 - 58 Sand, gray-brown, fine, slightly clayey; saturated

TEST HOLE NUMBER: 166

LOCATION: 098N-50W-34ADAA

LEGAL LOCATION: NE NE SE NE sec. 34, T. 098 N., R. 50 W.

9 - 20 Gravel, dark-brown, medium, sandy; oxidized, saturated

TEST HOLE NUMBER: 167

LOCATION: 098N-51W-05BDCC

LEGAL LOCATION: SW SW SE NW sec. 05, T. 098 N., R. 51 W.

20 - 32 Sand

TEST HOLE NUMBER: 168

LOCATION: 098N-51W-05CBBB

LEGAL LOCATION: NW NW NW SW sec. 05, T. 098 N., R. 51 W.

0 - 4 Gravel, reddish-brown, clayey, sandy; oxidized, dry
4 - 10 Gravel, reddish-brown, clayey, sandy; oxidized, moist
10 - 24 Gravel, dark-reddish-brown, clayey, sandy; oxidized, saturated
24 - 28 Sand, gray, coarse, very clayey, silty; unoxidized, saturated
28 - 55 Sand, gray, fine to medium; unoxidized, saturated; clean

TEST HOLE NUMBER: 169

LOCATION: 098N-51W-05CCCC

LEGAL LOCATION: SW SW SW SW sec. 05, T. 098 N., R. 51 W.

4 - 12 Gravel, brown, medium-grained

TEST HOLE NUMBER: 170

LOCATION: 098N-51W-06BBAA

LEGAL LOCATION: NE NE NW NW sec. 06, T. 098 N., R. 51 W.

0 - 13 Sand and gravel

TEST HOLE NUMBER: 171

LOCATION: 098N-51W-08ABAA

LEGAL LOCATION: NE NE NW NE sec. 08, T. 098 N., R. 51 W.

6 - 9 Sand, reddish-brown, medium to coarse, clayey; oxidized, saturated

TEST HOLE NUMBER: 172

LOCATION: 098N-51W-08ACCC

LEGAL LOCATION: SW SW SW NE sec. 08, T. 098 N., R. 51 W.

20 - 31 Sand, coarse, clayey

TEST HOLE NUMBER: 173

LOCATION: 098N-51W-08BAAA

LEGAL LOCATION: NE NE NE NW sec. 08, T. 098 N., R. 51 W.

6 - 50 Sand, medium to coarse; with some fine gravel

TEST HOLE NUMBER: 174

LOCATION: 098N-51W-08CDBC

LEGAL LOCATION: SW NW SE SW sec. 08, T. 098 N., R. 51 W.

9 - 14 Sand, fine to coarse, silty
14 - 18 Sand and gravel, fine to coarse sand; clean
18 - 29 Sand and gravel, fine to coarse sand, very silty; with a thin layer of fine gravel at 24 feet, stiff drilling

TEST HOLE NUMBER: 175

LOCATION: 098N-51W-08CDCA

LEGAL LOCATION: NE SW SE SW sec. 08, T. 098 N., R. 51 W.

7 - 10 Gravel and sand, fine gravel, fine to coarse sand, slightly silty

TEST HOLE NUMBER: 176

LOCATION: 098N-51W-08CDCD

LEGAL LOCATION: SE SW SE SW sec. 08, T. 098 N., R. 51 W.

3 - 7 Gravel and sand, fine gravel, medium to coarse sand; clean

TEST HOLE NUMBER: 177

LOCATION: 098N-51W-08CDCD 1

LEGAL LOCATION: SE SW SE SW sec. 08, T. 098 N., R. 51 W.

0 - 18 Gravel and sand, fine gravel, medium to coarse sand, slightly silty
18 - 29 Sand, medium to coarse; clean

TEST HOLE NUMBER: 178

LOCATION: 098N-51W-08CDDD

LEGAL LOCATION: SE SE SE SW sec. 08, T. 098 N., R. 51 W.

0 - 6 Sand, rust-colored, clayey
6 - 60 Sand, coarse, well-sorted; some fine gravel

TEST HOLE NUMBER: 179

LOCATION: 098N-51W-12CCCC

LEGAL LOCATION: SW SW SW SW sec. 12, T. 098 N., R. 51 W.

8 - 14 Sand, red; orthoclase; weathered granite boulder(?)

TEST HOLE NUMBER: 180

LOCATION: 098N-51W-14DDDD 1

LEGAL LOCATION: SE SE SE SE sec. 14, T. 098 N., R. 51 W.

16 - 20 Sand, fine to medium

TEST HOLE NUMBER: 181

LOCATION: 098N-51W-17AAAA

LEGAL LOCATION: NE NE NE NE sec. 17, T. 098 N., R. 51 W.

0 - 6 Gravel

TEST HOLE NUMBER: 182
LOCATION: 098N-51W-17DCCD
LEGAL LOCATION: SE SW SW SE sec. 17, T. 098 N., R. 51 W.

9 - 14 Sand and gravel, brown, medium sand, medium gravel, very clayey; oxidized (outwash)

TEST HOLE NUMBER: 183
LOCATION: 098N-51W-17DDDA
LEGAL LOCATION: NE SE SE SE sec. 17, T. 098 N., R. 51 W.

10 - 17 Sand, fine to coarse
22 - 47 Sand, fine to coarse

TEST HOLE NUMBER: 184
LOCATION: 098N-51W-19BBBB
LEGAL LOCATION: NW NW NW NW sec. 19, T. 098 N., R. 51 W.

2 - 7 Gravel

TEST HOLE NUMBER: 185
LOCATION: 098N-51W-19BBBB 1
LEGAL LOCATION: NW NW NW NW sec. 19, T. 098 N., R. 51 W.

3 - 35 Sand

TEST HOLE NUMBER: 186
LOCATION: 098N-51W-19BBBC
LEGAL LOCATION: SW NW NW NW sec. 19, T. 098 N., R. 51 W.

0 - 8 Sand and gravel, yellowish-brown, medium sand to medium pebble gravel; wide variety of rock types

TEST HOLE NUMBER: 187
LOCATION: 098N-51W-20ADDD
LEGAL LOCATION: SE SE SE NE sec. 20, T. 098 N., R. 51 W.

4 - 18 Sand, fine

TEST HOLE NUMBER: 188
LOCATION: 098N-51W-28CBCB
LEGAL LOCATION: NW SW NW SW sec. 28, T. 098 N., R. 51 W.

0 - 9 Sand and gravel, reddish-brown, coarse sand, fine to coarse gravel; oxidized, dry; clean
9 - 24 Sand, reddish-brown, coarse, clayey; oxidized, moist; water level at 9 feet
24 - 32 Gravel, gray, medium, clayey, sandy; unoxidized, moist
32 - 52 Sand, gray, medium to coarse; unoxidized, saturated; clean

TEST HOLE NUMBER: 189
LOCATION: 098N-51W-32DCCD
LEGAL LOCATION: SE SW SW SE sec. 32, T. 098 N., R. 51 W.

0 - 7 Sand, reddish-brown, medium to fine; oxidized, dry
7 - 12 Sand, reddish-brown, medium to fine; oxidized, saturated

12 - 18 Sand, light-reddish-brown, fine to coarse, slightly clayey; oxidized, saturated

TEST HOLE NUMBER: 190
LOCATION: 098N-51W-33BBCC
LEGAL LOCATION: SW SW NW NW sec. 33, T. 098 N., R. 51 W.

0 - 7 Sand and gravel, rusty-brown, fine sand, fine gravel; dry, oxidized
7 - 33 Sand, brown, fine to medium; saturated, oxidized, quartzose
33 - 53 Sand, brown, very fine; saturated, oxidized, quartzose

TEST HOLE NUMBER: 191
LOCATION: 098N-51W-33CCCD
LEGAL LOCATION: SE SW SW SW sec. 33, T. 098 N., R. 51 W.

1 - 7 Sand, brown, fine to medium, slightly clayey; oxidized, moist
7 - 18 Sand, reddish-brown, fine to medium, slightly clayey; oxidized, saturated

TEST HOLE NUMBER: 192
LOCATION: 099N-48W-16CCCC
LEGAL LOCATION: SW SW SW SW sec. 16, T. 099 N., R. 48 W.

0 - 14 Sand and gravel, fine sand to coarse gravel

TEST HOLE NUMBER: 193
LOCATION: 099N-48W-20DCCC
LEGAL LOCATION: SW SW SW SE sec. 20, T. 099 N., R. 48 W.

9 - 25 Sand, medium

TEST HOLE NUMBER: 194
LOCATION: 099N-48W-20DDDD
LEGAL LOCATION: SE SE SE SE sec. 20, T. 099 N., R. 48 W.

18 - 44 Sand, medium

TEST HOLE NUMBER: 195
LOCATION: 099N-48W-21BBAA
LEGAL LOCATION: NE NE NW NW sec. 21, T. 099 N., R. 48 W.

12 - 28 Sand, coarse
28 - 35 Gravel, coarse

TEST HOLE NUMBER: 196
LOCATION: 099N-48W-21BCCC 1
LEGAL LOCATION: SW SW SW NW sec. 21, T. 099 N., R. 48 W.

2 - 11 Sand, reddish-brown, medium to coarse, gravelly; oxidized, dry, clean; hit rock, could not penetrate, abandoned hole

TEST HOLE NUMBER: 197
LOCATION: 099N-48W-21BCCC 2

LEGAL LOCATION: SW SW SW NW sec. 21, T. 099 N., R. 48 W.

2 - 12 Sand, reddish-brown, medium to coarse, gravelly; oxidized, dry, clean; hit rock, abandoned hole

TEST HOLE NUMBER: 198

LOCATION: 099N-48W-21BCCC 3

LEGAL LOCATION: SW SW SW NW sec. 21, T. 099 N., R. 48 W.

2 - 12 Sand, reddish-brown, medium to coarse, gravelly; oxidized, dry, clean; hit rock, abandoned hole

TEST HOLE NUMBER: 199

LOCATION: 099N-48W-31DDDD

LEGAL LOCATION: SE SE SE SE sec. 31, T. 099 N., R. 48 W.

2 - 19 Sand, medium

TEST HOLE NUMBER: 200

LOCATION: 099N-48W-32ABBB

LEGAL LOCATION: NW NW NW NE sec. 32, T. 099 N., R. 48 W.

5 - 23 Sand, medium
23 - 25 Sand, medium, rocky

TEST HOLE NUMBER: 201

LOCATION: 099N-48W-32BAAA

LEGAL LOCATION: NE NE NE NW sec. 32, T. 099 N., R. 48 W.

0 - 2 Sand, brown, silty
2 - 7 Sand, brown, fine to medium
7 - 25 Sand and gravel, brown, fine to coarse sand; saturated

TEST HOLE NUMBER: 202

LOCATION: 099N-48W-32CBBC 1

LEGAL LOCATION: SW NW NW SW sec. 32, T. 099 N., R. 48 W.

5 - 16 Sand, reddish-brown, medium, slightly clayey; oxidized, dry; hit boulder, abandoned hole

TEST HOLE NUMBER: 203

LOCATION: 099N-48W-32CBBC 2

LEGAL LOCATION: SW NW NW SW sec. 32, T. 099 N., R. 48 W.

5 - 20 Sand, reddish-brown, medium, slightly gravelly; oxidized, dry
20 - 26 Sand, gray, medium, clayey; unoxidized, moist

TEST HOLE NUMBER: 204

LOCATION: 099N-48W-32DCDD

LEGAL LOCATION: SE SE SW SE sec. 32, T. 099 N., R. 48 W.

7 - 23 Sand, medium

TEST HOLE NUMBER: 205

LOCATION: 099N-48W-32DCDD 1

LEGAL LOCATION: SE SE SW SE sec. 32, T. 099 N., R. 48 W.

4 - 22 Sand and gravel, fine sand to coarse gravel
34 - 44 Sand, fine

TEST HOLE NUMBER: 206

LOCATION: 099N-48W-32DCDD 2

LEGAL LOCATION: SE SE SW SE sec. 32, T. 099 N., R. 48 W.

4 - 22 Sand and gravel, coarse sand to coarse gravel
34 - 65 Sand, medium to coarse; contains a lot of quartz and some green mineral

TEST HOLE NUMBER: 207

LOCATION: 099N-49W-05AAAA

LEGAL LOCATION: NE NE NE NE sec. 05, T. 099 N., R. 49 W.

13 - 25 Sand, gray, fine

TEST HOLE NUMBER: 208

LOCATION: 099N-49W-12AAAB

LEGAL LOCATION: NW NE NE NE sec. 12, T. 099 N., R. 49 W.

1 - 8 Sand and gravel, medium to coarse

TEST HOLE NUMBER: 209

LOCATION: 099N-49W-12AABA

LEGAL LOCATION: NE NW NE NE sec. 12, T. 099 N., R. 49 W.

1 - 14 Gravel, very coarse

TEST HOLE NUMBER: 210

LOCATION: 099N-49W-12AADD

LEGAL LOCATION: SE SE NE NE sec. 12, T. 099 N., R. 49 W.

0 - 18 Gravel, rusty-brown, medium to coarse, sandy; oxidized, dry
18 - 23 Gravel, coarse; cobbles, dry

TEST HOLE NUMBER: 211

LOCATION: 099N-49W-12ABBA

LEGAL LOCATION: NE NW NW NE sec. 12, T. 099 N., R. 49 W.

6 - 21 Gravel, brown, very coarse, slightly clayey, slightly sandy; oxidized; hit boulder at 21 feet;
abandoned hole

TEST HOLE NUMBER: 212

LOCATION: 099N-49W-17CCCB

LEGAL LOCATION: NW SW SW SW sec. 17, T. 099 N., R. 49 W.

24 - 37 Gravel

TEST HOLE NUMBER: 213

LOCATION: 099N-49W-31BCCB 1

LEGAL LOCATION: NW SW SW NW sec. 31, T. 099 N., R. 49 W.

20 - 30 Sand, very fine

TEST HOLE NUMBER: 214

LOCATION: 099N-49W-31DADA

LEGAL LOCATION: NE SE NE SE sec. 31, T. 099 N., R. 49 W.

8 - 35 Sand, brown, fine, slightly clayey; oxidized, moist at 15 feet, saturated at 35 feet
35 - 40 Sand, gray, fine, slightly clayey; unoxidized, saturated

TEST HOLE NUMBER: 215

LOCATION: 099N-49W-32DCDC

LEGAL LOCATION: SW SE SW SE sec. 32, T. 099 N., R. 49 W.

11 - 12 Sand, fine; small lens
22 - 57 Sand, fine to medium

TEST HOLE NUMBER: 216

LOCATION: 099N-50W-10BDDD

LEGAL LOCATION: SE SE SE NW sec. 10, T. 099 N., R. 50 W.

0 - 19 Sand, buff, very clayey

TEST HOLE NUMBER: 217

LOCATION: 099N-50W-29CCCB

LEGAL LOCATION: NW SW SW SW sec. 29, T. 099 N., R. 50 W.

1 - 10 Sand, reddish-brown, coarse, clayey; oxidized, moist
10 - 16 Sand and gravel, grayish-brown, coarse sand, fine to medium gravel, clayey; oxidized, moist;
water level at 10 feet

TEST HOLE NUMBER: 218

LOCATION: 099N-50W-30BBBB

LEGAL LOCATION: NW NW NW NW sec. 30, T. 099 N., R. 50 W.

10 - 21 Sand

TEST HOLE NUMBER: 219

LOCATION: 099N-50W-34DDAD

LEGAL LOCATION: SE NE SE SE sec. 34, T. 099 N., R. 50 W.

6 - 12 Sand, reddish-brown, coarse, clayey; oxidized, moist

TEST HOLE NUMBER: 220

LOCATION: 099N-51W-10CCCC

LEGAL LOCATION: SW SW SW SW sec. 10, T. 099 N., R. 51 W.

17 - 27 Sand, brown, fine-grained; with some clay

TEST HOLE NUMBER: 221

LOCATION: 099N-51W-28DDDD 1

LEGAL LOCATION: SE SE SE SE sec. 28, T. 099 N., R. 51 W.

22 - 25 Gravel, coarse
25 - 43 Gravel; interbedded with clay

TEST HOLE NUMBER: 222
LOCATION: 099N-51W-30CCCC
LEGAL LOCATION: SW SW SW SW sec. 30, T. 099 N., R. 51 W.

7 - 14 Gravel

TEST HOLE NUMBER: 223
LOCATION: 099N-51W-31BCCC
LEGAL LOCATION: SW SW SW NW sec. 31, T. 099 N., R. 51 W.

2 - 5 Sand and gravel, reddish-brown, coarse sand, fine gravel; oxidized, dry

TEST HOLE NUMBER: 224
LOCATION: 099N-51W-31DCCD
LEGAL LOCATION: SE SW SW SE sec. 31, T. 099 N., R. 51 W.

8 - 17 Sand, brown, fine

TEST HOLE NUMBER: 225
LOCATION: 099N-51W-31DDCA
LEGAL LOCATION: NE SW SE SE sec. 31, T. 099 N., R. 51 W.

8 - 39 Sand; water bearing

TEST HOLE NUMBER: 226
LOCATION: 099N-51W-34CCBC
LEGAL LOCATION: SW NW SW SW sec. 34, T. 099 N., R. 51 W.

17 - 19 Sand, fine to medium

TEST HOLE NUMBER: 227
LOCATION: 100N-49W-13BBBB
LEGAL LOCATION: NW NW NW NW sec. 13, T. 100 N., R. 49 W.

1 - 24 Sand, brown, pebbly

TEST HOLE NUMBER: 228
LOCATION: 100N-49W-22AAAB
LEGAL LOCATION: NW NE NE NE sec. 22, T. 100 N., R. 49 W.

7 - 9 Sand and gravel, medium to coarse
39 - 40 Gravel

TEST HOLE NUMBER: 229
LOCATION: 100N-49W-23CCBB
LEGAL LOCATION: NW NW SW SW sec. 23, T. 100 N., R. 49 W.

- 2 - 9 Sand, gray, fine, very clayey; moist
- 9 - 16 Sand, gray, fine to coarse, very clayey; saturated
- 16 - 22 Gravel, gray, very clayey; saturated

TEST HOLE NUMBER: 230
 LOCATION: 100N-49W-26CCAC
 LEGAL LOCATION: SW NE SW SW sec. 26, T. 100 N., R. 49 W.

- 18 - 28 Sand, yellow-brown, medium to coarse, pebbly, angular; contains abundant limestone and shale clasts

TEST HOLE NUMBER: 231
 LOCATION: 100N-49W-31BBAA
 LEGAL LOCATION: NE NE NW NW sec. 31, T. 100 N., R. 49 W.

- 1 - 3 Sand, fine to medium (eolian?)
- 19 - 44 Gravel, medium, sandy (outwash)

TEST HOLE NUMBER: 232
 LOCATION: 100N-49W-32DDDD 2
 LEGAL LOCATION: SE SE SE SE sec. 32, T. 100 N., R. 49 W.

- 1 - 8 Sand, rust-red, medium

TEST HOLE NUMBER: 233
 LOCATION: 100N-49W-33BBBB 2
 LEGAL LOCATION: NW NW NW NW sec. 33, T. 100 N., R. 49 W.

- 4 - 8 Sand, yellow, medium-grained

TEST HOLE NUMBER: 234
 LOCATION: 100N-49W-33DDDC
 LEGAL LOCATION: SW SE SE SE sec. 33, T. 100 N., R. 49 W.

- 3 - 7 Gravel, sandy
- 7 - 20 Sand and gravel

TEST HOLE NUMBER: 235
 LOCATION: 100N-49W-34BDCC
 LEGAL LOCATION: SW SW SE NW sec. 34, T. 100 N., R. 49 W.

 * THIS LOG CONTAINS UNVERIFIED INFORMATION *

- 12 - 17 Sand

TEST HOLE NUMBER: 236
 LOCATION: 100N-50W-10DDDD
 LEGAL LOCATION: SE SE SE SE sec. 10, T. 100 N., R. 50 W.

- 12 - 25 Sand, brown, medium; some pebbles

TEST HOLE NUMBER: 237
LOCATION: 100N-50W-25BBBA
LEGAL LOCATION: NE NW NW NW sec. 25, T. 100 N., R. 50 W.

0 - 2 Sand, brown, medium-grained

TEST HOLE NUMBER: 238
LOCATION: 100N-50W-29AAAA
LEGAL LOCATION: NE NE NE NE sec. 29, T. 100 N., R. 50 W.

0 - 4 Sand, medium, clayey

TEST HOLE NUMBER: 239
LOCATION: 100N-51W-11CCDC
LEGAL LOCATION: SW SE SW SW sec. 11, T. 100 N., R. 51 W.

0 - 2 Sand, fine to medium

TEST HOLE NUMBER: 240
LOCATION: 100N-51W-28BBAA
LEGAL LOCATION: NE NE NW NW sec. 28, T. 100 N., R. 51 W.

1 - 8 Sand, red-brown, fine to medium, slightly clayey; oxidized
8 - 22 Sand, brown, fine to medium, slightly clayey; oxidized, saturated at 16 feet

TEST HOLE NUMBER: 241
LOCATION: 100N-51W-28CBBB
LEGAL LOCATION: NW NW NW SW sec. 28, T. 100 N., R. 51 W.

1 - 8 Sand, brown, fine to medium; oxidized, dry; clean
8 - 32 Sand, brown, fine to medium, clayey; oxidized, moist; saturated at 15 feet

TEST HOLE NUMBER: 242
LOCATION: 100N-51W-29CCBC
LEGAL LOCATION: SW NW SW SW sec. 29, T. 100 N., R. 51 W.

0 - 6 Sand and gravel, brown, medium to coarse sand, very coarse gravel, clayey; oxidized, dry

TEST HOLE NUMBER: 243
LOCATION: 100N-51W-32CDDC
LEGAL LOCATION: SW SE SE SW sec. 32, T. 100 N., R. 51 W.

6 - 11 Sand, reddish-brown, coarse, clayey; saturated, oxidized

TEST HOLE NUMBER: 244
LOCATION: 100N-51W-33CCCB
LEGAL LOCATION: NW SW SW NW sec. 33, T. 100 N., R. 51 W.

* THIS LOG CONTAINS UNVERIFIED INFORMATION *

16 - 38 Gravel

APPENDIX B: List of land tracts in Lincoln County, South Dakota, which are on file with either the South Dakota Department of Transportation, or the Office of Minerals and Mining, Department of Environment and Natural Resources, located in Pierre, South Dakota.

EXPLANATION:

Column Description:

- a. Landowner and address
- b. Location - given in half and quarter sections, section number, township, and range
- c. Aggregate type
- d. Average thickness of deposits in feet
- e. Average thickness of overburden in feet

Land Tract 1

- a. Landowner: E. L. HENDRICK - HUDSON
- b. Location: NE $\frac{1}{4}$ sec. 13, T. 96 N., R. 48 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 12 - 20
- e. Overburden thickness (ft): 0.5 - 3

Land Tract 2

- a. Landowner: MERLE SOLBERG - HUDSON
- b. Location: NE $\frac{1}{4}$ sec. 24, T. 96 N., R. 48 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness: ---
- e. Overburden thickness (ft): ---

Land Tract 3

- a. Landowner: J. COLE AND R. COLE - HUDSON
- b. Location: E $\frac{1}{2}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 25, T. 96 N., R. 48 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 10
- e. Overburden thickness (ft): 2.9

Land Tract 4

- a. Landowner: JOHN GILLMAN - HUDSON
- b. Location: NW $\frac{1}{4}$ sec. 36, T. 96 N., R. 48 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 30
- e. Overburden thickness (ft): 3

Land Tract 5

- a. Landowner: ---
- b. Location: SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 10, T. 96 N., R. 49 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 6

- a. Landowner: ALDER ODELL
- b. Location: E½ SW¼ sec. 14, T. 97 N., R. 48 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 7

- a. Landowner: LINCOLN COUNTY HIGHWAY DEPT. - CANTON
- b. Location: E½ SW¼ sec. 14, T. 97 N., R. 48 W.
- c. Aggregate type: ---
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 8

- a. Landowner: CHICAGO-MILWAUKEE-ST. PAUL R.R.
- b. Location: NW¼ sec. 23, T. 97 N., R. 48 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 9

- a. Landowner: SAM POPPENG - LENNOX
- b. Location: NE¼ sec. 5, T. 97 N., R. 51 W.
- c. Aggregate type: SAND AND FINE GRAVEL
- d. Deposit thickness (ft): 10
- e. Overburden thickness (ft): 2

Land Tract 10

- a. Landowner: CARL POPPENG - LENNOX
- b. Location: SE¼ sec. 5, T. 97 N., R. 51 W.
- c. Aggregate type: SAND AND GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 11

- a. Landowner: RUSSEL MYERS - CENTERVILLE
- b. Location: NW¼ sec. 17, T. 97 N., R. 51 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 12
- e. Overburden thickness (ft): 2

Land Tract 12

- a. Landowner: ROY SHOGREN - CENTERVILLE
- b. Location: E½ SW¼ sec. 17, T. 97 N., R. 51 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 6
- e. Overburden thickness (ft): 1.5

Land Tract 13

- a. Landowner: RALPH LANDSMAN - CENTERVILLE
- b. Location: NE $\frac{1}{4}$ sec. 25, T. 97 N., R. 51 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 14

- a. Landowner: PETER J. NELSON - CANTON
- b. Location: NE $\frac{1}{4}$ sec. 5, T. 98 N., R. 48 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 15

- a. Landowner: DRAPER HELDER - CANTON
- b. Location: NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 5, T. 98 N., R. 48 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 16

- a. Landowner: DRAPER HELDER - CANTON
- b. Location: SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 5, T. 98 N., R. 48 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 17

- a. Landowner: DRAPER HELDER - CANTON
- b. Location: NE $\frac{1}{4}$ sec. 8, T. 98 N., R. 48 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 6
- e. Overburden thickness (ft): 2.1

Land Tract 18

- a. Landowner: DRAPER HELDER - CANTON
- b. Location: SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 8, T. 98 N., R. 48 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 19

- a. Landowner: DRAPER HELDER - CANTON
- b. Location: SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 8, T. 98 N., R. 48 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 20

- a. Landowner: JACK CARPENTER - CANTON
- b. Location: NE $\frac{1}{4}$ sec. 17, T. 98 N., R. 48 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 21

- a. Landowner: ROSCOE G. MCVAY - CANTON
- b. Location: SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 17, T. 98 N., R. 48 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 8.7
- e. Overburden thickness (ft): 3.3

Land Tract 22

- a. Landowner: MYRL AND ROY'S PAVING, INC. - SIOUX FALLS
- b. Location: SE $\frac{1}{4}$ sec. 17, T. 98 N., R. 48 W.
- c. Aggregate type: ---
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 23

- a. Landowner: ROSCOE G. MCVAY - CANTON
- b. Location: SE $\frac{1}{4}$ sec. 17, T. 98 N., R. 48 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 6.8
- e. Overburden thickness (ft): 3.5

Land Tract 24

- a. Landowner: LEO JOHNSON - CANTON
- b. Location: W $\frac{1}{2}$ NW $\frac{1}{4}$ sec. 14, T. 98 N., R. 49 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 25

- a. Landowner: ---
- b. Location: SE $\frac{1}{4}$ sec. 15, T. 98 N., R. 49 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 26

- a. Landowner: W.W. FOWLER - CANTON
- b. Location: W $\frac{1}{2}$ SE $\frac{1}{4}$ sec. 22, T. 98 N., R. 49 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 12
- e. Overburden thickness (ft): 1.5

Land Tract 27

- a. Landowner: OBEL ULRICKSON - CANTON
- b. Location: SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 22, T. 98 N., R. 49 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 4.3
- e. Overburden thickness (ft): 3.1

Land Tract 28

- a. Landowner: HENRY CORNELIUS - CANTON
- b. Location: SW $\frac{1}{4}$ sec. 24, T. 98 N., R. 49 W.
- c. Aggregate type: SAND
- d. Deposit thickness (ft): 10
- e. Overburden thickness (ft): 3.5

Land Tract 29

- a. Landowner: CLARENCE M. PETERSON - SIOUX FALLS
- b. Location: NE $\frac{1}{4}$ sec. 27, T. 98 N., R. 49 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 4
- e. Overburden thickness (ft): 3

Land Tract 30

- a. Landowner: FOWLER ESTATE - CANTON
- b. Location: NW $\frac{1}{4}$ sec. 27, T. 98 N., R. 49 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 31

- a. Landowner: HENRY LIER - CANTON
- b. Location: NE $\frac{1}{4}$ sec. 28, T. 98 N., R. 49 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 5
- e. Overburden thickness (ft): 3

Land Tract 32

- a. Landowner: MARY DEVITT - PALM SPRINGS, CALIFORNIA
- b. Location: NW $\frac{1}{4}$ sec. 28, T. 98 N., R. 49 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 11
- e. Overburden thickness (ft): 3.4

Land Tract 33

- a. Landowner: JOHN URBEN - CANTON
- b. Location: W $\frac{1}{2}$ SW $\frac{1}{4}$ sec. 28, T. 98 N., R. 49 W.
- c. Aggregate type: SAND
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 34

- a. Landowner: PHIL RENNER - CANTON
- b. Location: SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 30, T. 98 N., R. 49 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 6
- e. Overburden thickness (ft): 2

Land Tract 35

- a. Landowner: ---
- b. Location: NW $\frac{1}{4}$ sec. 2, T. 98 N., R. 51 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 36

- a. Landowner: NELLIE BOSSMAN - SHELDON, IOWA
- b. Location: E $\frac{1}{2}$ SW $\frac{1}{4}$ sec. 5, T. 98 N., R. 51 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 37

- a. Landowner: ELROY BOSSMAN - LENNOX
- b. Location: W $\frac{1}{2}$ SW $\frac{1}{4}$ sec. 5, T. 98 N., R. 51 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 38

- a. Landowner: NELLIE BOSSMAN - SHELDON, IOWA
- b. Location: SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 5, T. 98 N., R. 51 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 39

- a. Landowner: HENRY E. SMIT - LENNOX
- b. Location: NE $\frac{1}{4}$ sec. 6, T. 98 N., R. 51 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 40

- a. Landowner: ---
- b. Location: NE $\frac{1}{4}$ sec. 8, T. 98 N., R. 51 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 41

- a. Landowner: SAM BUSE - LENNOX
- b. Location: E½ NW¼ sec. 8, T. 98 N., R. 51 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 8
- e. Overburden thickness (ft): 2.5

Land Tract 42

- a. Landowner: BEN BURMA - LENNOX
- b. Location: NW¼ sec. 8, T. 98 N., R. 51 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 8.5
- e. Overburden thickness (ft): 4.5

Land Tract 43

- a. Landowner: DICK KNOCK -LENNOX
- b. Location: SE¼ SW¼ sec. 8, T. 98 N., R. 51 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 6.3
- e. Overburden thickness (ft): 2.5

Land Tract 44

- a. Landowner: CLARENCE OURE - БЕЛОИТ, IOWA
- b. Location: NE¼ sec. 20, T. 98 N., R. 51 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 10
- e. Overburden thickness (ft): 1

Land Tract 45

- a. Landowner: RUSSEL SCHNEIDERMAN - LENNOX
- b. Location: SE¼ sec. 20, T. 98 N., R. 51 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 8.3
- e. Overburden thickness (ft): 3

Land Tract 46

- a. Landowner: ---
- b. Location: SW¼ sec. 28, T. 98 N., R. 51 W.
- c. Aggregate type: SAND AND GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 47

- a. Landowner: HENRY SMIT - LENNOX
- b. Location: NE¼ sec. 32, T. 98 N., R. 51 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 48

- a. Landowner: ---
- b. Location: SE $\frac{1}{4}$ sec. 32, T. 98 N., R. 51 W.
- c. Aggregate type: SAND AND GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 49

- a. Landowner: LAWRENCE SWANSON - CANTON
- b. Location: NW $\frac{1}{4}$ sec. 7, T. 99 N., R. 48 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 50

- a. Landowner: V. SWANSON AND L. SWANSON - SIOUX FALLS
- b. Location: NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 7, T. 99 N., R. 48 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 10 - 12
- e. Overburden thickness (ft): 1.5 - 3.0

Land Tract 51

- a. Landowner: FRANK N. JONES - CANTON
- b. Location: NE $\frac{1}{4}$ sec. 29, T. 99 N., R. 48 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 52

- a. Landowner: FRANK N. JONES - CANTON
- b. Location: SW $\frac{1}{4}$ sec. 29, T. 99 N., R. 48 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 53

- a. Landowner: FRANK N. JONES - CANTON
- b. Location: SE $\frac{1}{4}$ sec. 29, T. 99 N., R. 48 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 54

- a. Landowner: RICHARD LOMMEN - HARRISBURG
- b. Location: NE $\frac{1}{4}$ sec. 32, T. 99 N., R. 48 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 55

- a. Landowner: LINCOLN COUNTY HIGHWAY DEPT. - CANTON
- b. Location: N $\frac{1}{2}$ NE $\frac{1}{4}$ sec. 32, T. 99 N., R. 48 W.
- c. Aggregate type: ---
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 56

- a. Landowner: RICHARD LOMMEN - HARRISBURG
- b. Location: N $\frac{1}{2}$ NE $\frac{1}{4}$ sec. 32, T. 99 N., R. 48 W.
- c. Aggregate type: ---
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 57

- a. Landowner: TED PICK - CANTON
- b. Location: SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 1, T. 99 N., R. 49 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 58

- a. Landowner: TED PICK - CANTON
- b. Location: W $\frac{1}{2}$ sec. 1, T. 99 N., R. 49 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 7.8
- e. Overburden thickness (ft): 3.2

Land Tract 59

- a. Landowner: LIZZIE EVENSON
- b. Location: NE $\frac{1}{4}$ sec. 8, T. 99 N., R. 49 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 60

- a. Landowner: LAWRENCE SWANSON - CANTON
- b. Location: NE $\frac{1}{4}$ sec. 12, T. 99 N., R. 49 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 61

- a. Landowner: E.E. SOLEM - WORTHING
- b. Location: SW $\frac{1}{4}$ sec. 33, T. 99 N., R. 50 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 62

- a. Landowner: H.A. ROETZEL
- b. Location: SE¼ sec. 33, T. 99 N., R. 50 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 63

- a. Landowner: EVERETT H. SCHNEIDERMAN - LENNOX
- b. Location: NW¼ sec. 9, T. 99 N., R. 51 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 6
- e. Overburden thickness (ft): 3

Land Tract 64

- a. Landowner: H. SMIT AND CHRISTINE SMIT - LENNOX
- b. Location: SE¼ sec. 31, T. 99 N., R. 51 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 9
- e. Overburden thickness (ft): ---

Land Tract 65

- a. Landowner: CARL PICTERS - LARCHWOOD, IOWA
- b. Location: NW¼ sec. 24, T. 100 N., R. 49 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 66

- a. Landowner: M. JOHNSON - LARCHWOOD, IOWA
- b. Location: SW¼ sec. 24, T. 100 N., R. 49 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): ---
- e. Overburden thickness (ft): ---

Land Tract 67

- a. Landowner: ART EVENSON - VALLEY SPRINGS
- b. Location: NE¼ sec. 34, T. 100 N., R. 49 W.
- c. Aggregate type: GRAVEL
- d. Deposit thickness (ft): 10
- e. Overburden thickness (ft): 2.5