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Wilson M. Laird, State Geologist

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COUNTY GROUND WATER STUDIES 13

Geology and Ground Water Resources

of

Grand Forks County

Part 2

GROUND WATER BASIC DATA

by

T. E. KELLY

Geological Survey

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and the Grand Forks County Water Management District.

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CONTENTS

	<u>Page</u>
Introduction-----	1
Purpose and scope-----	1
Well-numbering system-----	3
Acknowledgments-----	3
Explanation of tables-----	3
Water-quality data-----	5
Mineral constituents in solution-----	5
Properties and characteristics of water-----	8
Selected references-----	11

ILLUSTRATIONS

Plate 1 Map showing location of wells, springs, and test holes in Grand Forks County, North Dakota-----	(in pocket)
Figure 1. Map showing location of county ground-water studies-----	2
2. Diagram showing system of numbering wells, springs, and test holes---	4

TABLES

Table 1. Records of wells, springs, and test holes-----	12
2. Water-level records of selected observation wells-----	40
3. Logs of test holes and selected wells-----	57
4. Chemical analyses of selected water samples-----	116

GEOLOGY AND GROUND WATER RESOURCES OF GRAND FORKS COUNTY, NORTH DAKOTA
PART II - GROUND WATER BASIC DATA

By

T. E. Kelly

INTRODUCTION

Purpose and Scope

The purposes of the investigation of the geology and ground-water resources of Grand Forks County, N. Dak. (fig. 1) were to determine the location and extent of the ground-water reservoirs (aquifers); to evaluate the occurrence and movement of ground water, including the sources of recharge and discharge; and to determine the chemical quality of the ground water. The investigation should provide sufficient information about the occurrence of ground water to plan its safe and intelligent development for irrigation, domestic, industrial, and municipal purposes.

The investigation was made cooperatively by the U.S. Geological Survey, North Dakota State Water Commission, North Dakota Geological Survey, and the Grand Forks County Board of Commissioners. The results of the investigation will be published in three separate parts of the bulletin series of the North Dakota Geological Survey and the county ground-water studies series of the North Dakota State Water Commission. Part I is an interpretive report describing the geology, Part II is a compilation of the ground-water basic data, and Part III is an interpretive report describing the ground-water resources. Part II makes available hydrologic data collected during the county investigation and functions as a reference for Parts I and III.

The information in this report was collected chiefly between 1964 and 1967 and consists of the following: (1) data on about 1,000 wells, springs, and test holes; (2) water-level measurements in 69 observation wells; (3) logs of about 160 test holes and selected wells; and (4) chemical analyses of 96 water samples.

The data in this report are useful for predicting geologic and ground-water conditions in Grand Forks County. For example; a person considering the construction of a new well can locate the proposed site on plate 1. The characteristics of nearby wells may be determined from table 1, and the water-level fluctuation in the area may be determined from table 2. The type of material encountered in nearby wells may be determined from table 3, and the chemical quality of water in adjacent wells may be determined from table 4. Extrapolations based on these data should be conservative because of the irregular distribution of the water-bearing rocks.

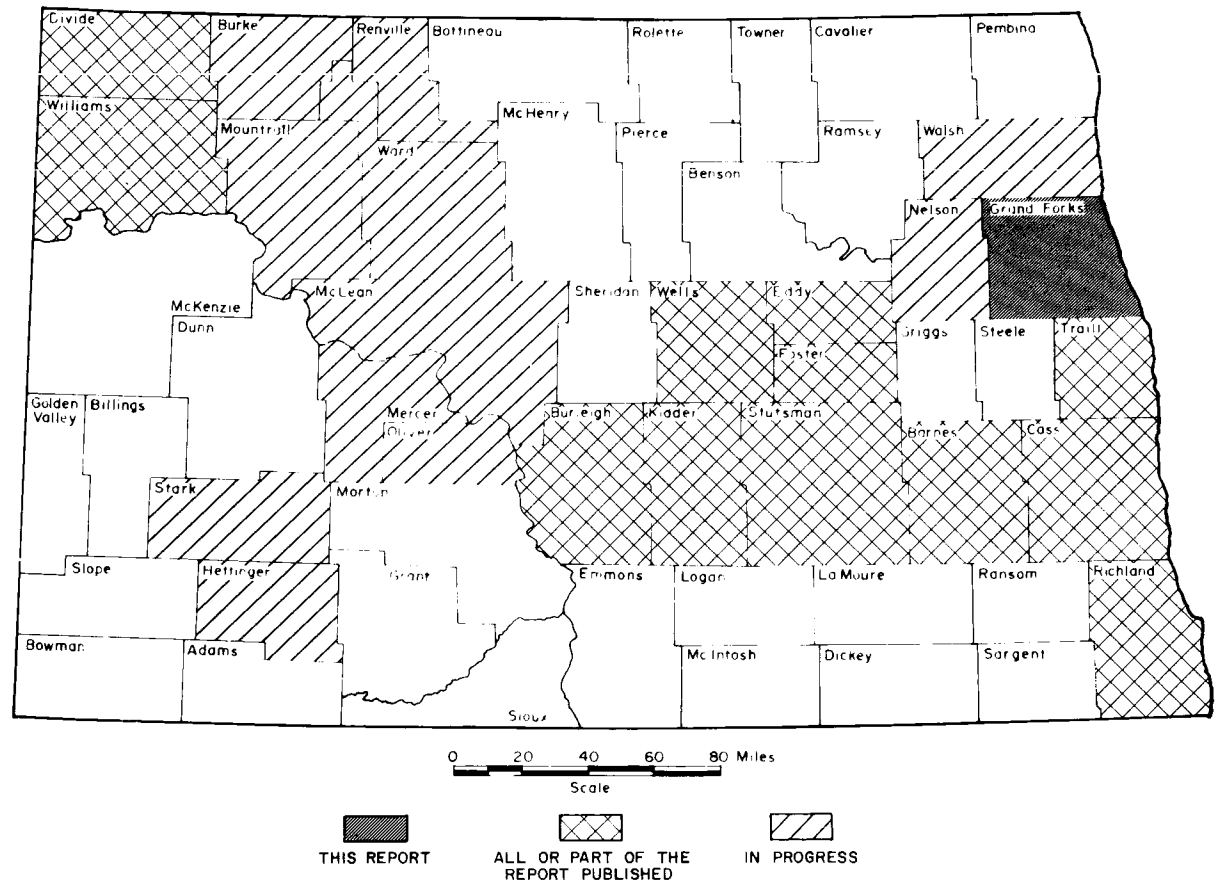


Figure 1. Location of county ground-water studies.

Well-Numbering System

The wells, springs, and test holes in the tables are numbered according to a system based on the location in the public land classification of the U.S. Bureau of Land Management. It is illustrated in figure 2. The first numeral denotes the township north of a base line, the second numeral denotes the range west of the fifth principal meridian, and the third numeral denotes the section in which the well is located. The letters a, b, c, and d designate, respectively, the northeast, northwest, southwest, and southeast quarter sections, quarter-quarter sections, and quarter-quarter-quarter-sections (10-acre tract). For example, well 149-51-15aaa is in the $NE\frac{1}{4}NE\frac{1}{4}NE\frac{1}{4}$ sec. 15, T. 149 N., R. 51 W. Consecutive terminal numerals are added if more than one well is recorded within a 10-acre tract. The location of each well, spring, and test hole listed in the tables is shown on plate 1 (in pocket).

Acknowledgments

The cooperation of the residents of the county and the municipal and county officials is gratefully acknowledged. Most of the test hole logs used in this report were based on well-site analyses made by Alain Kahl and Clifford Beeks of the North Dakota State Water Commission.

Thanks is due to the numerous well drillers and engineers who contributed logs and information for this report.

EXPLANATION OF TABLES

Water levels in observation wells were measured periodically beginning in the summer of 1964. During most of 1965 and 1966, from 70 to 80 wells were measured each month, and 4 wells were equipped with continuous water-level recorders. About 10 of these observation wells will continue to be measured as part of the statewide observation well network. The locations of observation wells are shown on plate 1.

The logs given in table 3 were prepared from sample description logs obtained for all test holes drilled for this project. Visual examination, when the samples were obtained during drilling of the hole, was made by using a binocular microscope. Color descriptions were determined by comparing the sample with the Geological Society of America rock-color chart (1963). Grain-size determinations used in the logs refer to the Wentworth (1922) size scale. Nearly all of the samples reacted (effervesced) when treated with diluted hydrochloric acid and therefore were considered calcareous. Any variation in the amount of calcareousness was noted on the sample logs in table 3.

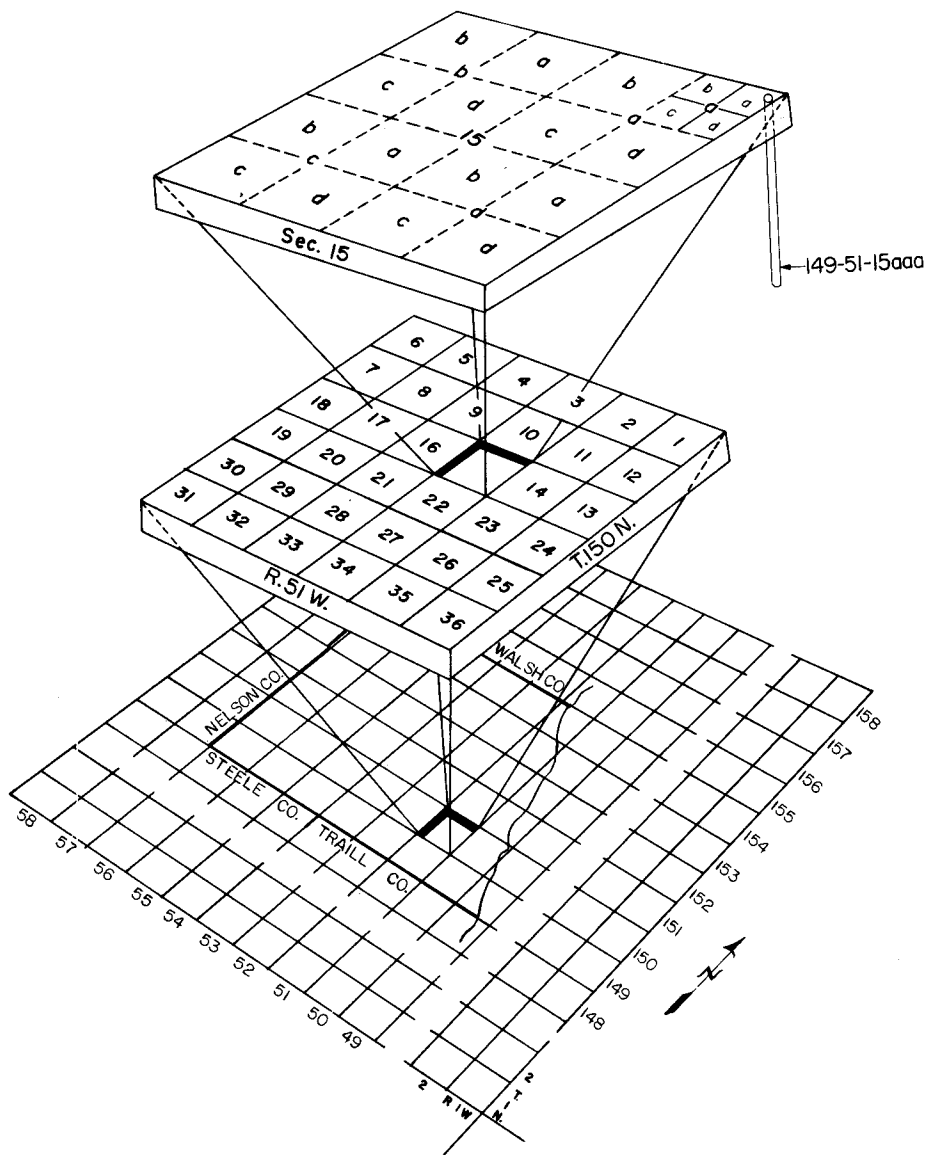


Figure 2. System of numbering wells, springs, and test holes.

The term "till" indicates an unsorted, unstratified, cohesive, agglomeration of rock particles ranging from clay to boulders. Generally clay is the dominant particle size. If a particle size other than clay is present in appreciable amounts, that particle size is used as a modifying term. Consequently, terms such as silty, sandy, or gravelly are textural terms used to indicate that the material described contains an appreciable but not a dominant amount of the modifying material.

The lithologic descriptions for U.S. Geological Survey and North Dakota State Water Commission test holes in table 3 are a composite from the driller's log, sample analysis log, and electric log (where available). The other logs are from various sources, and are mostly driller's logs. The stratigraphic nomenclature used in this report is that of the North Dakota Geological Survey and, in some instances, differs from that of the U.S. Geological Survey.

WATER-QUALITY DATA

All natural waters contain dissolved mineral matter. Water in contact with soils or rock, even for only a few hours, will dissolve some mineral matter. The quantity of dissolved mineral matter in a natural water depends primarily on the type of rocks or soils with which the water has been in contact and the length of time of contact. Ground water is generally more highly mineralized than surface water because it remains in contact with the rocks and soils for much longer periods.

The mineral constituents and physical properties of natural waters reported in the table of analyses include those that have a practical bearing on the value of the waters for most purposes. The analyses generally include determinations of silica, iron, calcium, magnesium, sodium, potassium (or sodium and potassium together calculated as sodium), alkalinity as carbonate and bicarbonate, sulfate, chloride, fluoride, nitrate, boron, dissolved solids, pH, and specific conductance. The source and significance of the different constituents and properties of natural waters are discussed in the following paragraphs.

Mineral Constituents in Solution

Silica (SiO_2)

Silica is dissolved from practically all rocks. Some natural waters contain less than 5 ppm (parts per million) of silica and few contain more than 50 ppm, but the more common range is from 10 to 30 ppm. Silica affects the usefulness of a water because it contributes to the formation of scale in pipes, water heaters, and boilers.

Iron (Fe)

Iron is dissolved from many rocks and soils. On exposure to air, normal basic waters that contain more than 1 ppm of iron soon become turbid with the insoluble reddish ferric oxide produced by oxidation. Surface waters, therefore, seldom contain as much as 1 ppm of dissolved iron, although some acid waters carry large quantities of iron in solution. Ground waters commonly contain up to 10 ppm. Rarely, concentrations over 50 ppm may occur in waters with a pH of 5 to 8 (Hem, 1959). Iron causes reddish-brown stains on porcelain or enameled ware and fixtures and on fabrics washed in the water. The U.S. Public Health Service (1962) recommends an upper limit of 0.3 ppm of iron in drinking water.

Calcium (Ca)

Calcium is dissolved from almost all rocks and soils. Calcium and magnesium cause hard water and are largely responsible for the formation of scale in pipes, water heaters, and boilers. Water associated with granite or silicious sands may contain less than 10 ppm of calcium, whereas water associated with dolomite and limestone may contain from 30 to 100 ppm. Water that has been in contact with deposits of gypsum may contain several hundred parts per million of calcium.

Magnesium (Mg)

Magnesium is dissolved from many rocks, particularly from dolomitic rocks. Its effect in water is similar to that of calcium. The magnesium in soft waters may amount to only 1 or 2 ppm, but water in areas that contain large quantities of dolomite or other magnesium-bearing rocks may contain from 20 to 100 ppm or more of magnesium.

Sodium and potassium (Na and K)

Sodium and potassium are dissolved from practically all rocks. Sodium is the predominant cation in some of the more highly mineralized waters found in the western United States. Natural waters that contain only 3 or 4 ppm of the two together are likely to carry almost as much potassium as sodium. As the total quantity of these constituents increases, the proportion of sodium becomes much greater. However, the potassium concentration in water does not often exceed 50 ppm. Moderate quantities of sodium and potassium have little effect on the usefulness of the water for most purposes, but waters that carry more than 50 or 100 ppm of the two may require careful operation of steam boilers to prevent foaming. More highly mineralized waters that contain a large proportion of sodium salts may be unsatisfactory for irrigation. The presence

of several hundred parts per million of sodium in water makes it unsuitable for use in sodium-restricted diets used as therapy for cardiovascular diseases.

Bicarbonate and carbonate (HCO_3 and CO_3)

Bicarbonate and carbonate are sometimes reported as alkalinity. Since the major causes of alkalinity in most natural waters are carbonate and bicarbonate ions dissolved from carbonate rocks, the results are usually reported in terms of these constituents. Although alkalinity is primarily due to the presence of carbonate and bicarbonate, other ions also contribute to alkalinity such as silicates, phosphates, borates, possibly fluoride, and certain organic anions which may occur in colored waters. The significance of alkalinity to the domestic, agricultural, and industrial user is usually dependent upon the nature of the cations (Ca, Mg, Na, K) associated with it. However, moderate amounts of alkalinity do not adversely affect most use.

Sulfate (SO_4)

Sulfate is dissolved from many rocks and soils--in especially large quantities from gypsum and from beds of shale. It is formed also by the oxidation of sulfides of iron and may therefore be present in considerable quantities in mine waters. The concentration of sulfate in waters is generally limited to about 1,500 ppm by the solubility of calcium sulfate. Sulfate in waters that contain much calcium and magnesium causes the formation of hard scale in steam boilers and may increase the cost of softening the water. The U.S. Public Health Service (1962) recommends that 250 ppm of sulfate should be the upper limit for drinking water.

Chloride (Cl)

Chlorides are generally very soluble compounds and are found in most rocks so that chlorides are found in all natural waters. Large quantities of chloride may affect the industrial use of water by increasing the corrosiveness of waters that contain large quantities of calcium and magnesium. The U.S. Public Health Service (1962) recommends an upper limit of 250 ppm of chloride for drinking water.

Fluoride (F)

Fluoride has been reported as being present in igneous and some sedimentary rocks to about the same extent as chloride. However, most fluorides, unlike the chlorides, are low in solubility so that the quantity of fluoride in natural waters is ordinarily very small compared to that of chloride. Hem (1959) reported that fluoride concentrations in excess of 10 ppm are rare. Investigations have proved that fluoride concentrations of about 0.6 to 1.7 ppm reduced the incidence of dental caries and that concentrations

greater than 1.7 ppm also protect the teeth from cavities but cause an undesirable black stain (Durfor and Becker, 1964). U.S. Public Health Service (1962, p. 8) states, "When fluoride is naturally present in drinking water, the concentration should not average more than the appropriate upper control limit (0.6 to 1.7 ppm). Presence of fluoride in average concentrations greater than two times the optimum shall constitute grounds for rejection of the supply." Concentration higher than the stated limits may cause mottled enamel in teeth, endemic cumulative fluorosis, and skeletal effects.

Nitrate (NO₃)

Nitrate in water is considered a final oxidation product of nitrogenous material and may indicate contamination by sewage or other organic matter. U.S. Public Health Service (1962) sets 45 ppm as the upper limit for nitrate. Ingestion of excessive quantities of nitrate may result in infantile methemoglobinemia. If the concentration is sufficiently great, both man and animals can be poisoned by nitrate.

Boron (B)

Boron in small quantities has been found essential for plant growth, but irrigation water containing more than 1 ppm boron is detrimental to navy beans and other boron-sensitive crops.

Dissolved solids

The reported quantity of dissolved solids--the residue on evaporation--consists mainly of the dissolved mineral constituents in the water. It may also contain some organic matter and water of crystallization. Waters with less than 500 ppm of dissolved solids are usually satisfactory for domestic and some industrial uses. Water containing several thousand parts per million of dissolved solids are sometimes successfully used for irrigation where practices permit the removal of soluble salts through the application of large volumes of water on well-drained lands, but generally water containing more than about 2,000 ppm is considered to be unsuitable for long-term irrigation under average conditions.

Properties and Characteristics of Water

Temperature

Temperature is an important factor in properly determining the quality of water. This is very evident for such a direct use as an industrial coolant. Temperature is also important, but perhaps not so evident, for its indirect influence upon concentrations of dissolved gases and distribution of chemical solutes in ground water. Normally, the

temperature of ground water within 60 feet of the surface approximates the mean annual air temperature and increases 1°F for each 60 to 100 feet increase with depth.

Hardness

Hardness is the characteristic of water that receives the most attention in industrial and domestic use. It is commonly recognized by the increased quantity of soap required to produce lather. The use of hard water is also objectionable because it contributes to the formation of scale in boilers, water heaters, radiators, and pipes, with the resultant decrease in rate of heat transfer, possibility of water heater or boiler failure, and loss of flow.

Hardness is caused almost entirely by compounds of calcium and magnesium. Other constituents--such as iron, manganese, aluminum, barium, strontium, and free acid--also cause hardness, although they usually are not present in quantities large enough to have any appreciable effect.

Generally, bicarbonate and carbonate determine the proportions of "carbonate" hardness of water. Carbonate hardness is the amount of hardness chemically equivalent to the amount of bicarbonate and carbonate in solution. Carbonate hardness is approximately equal to the amount of hardness that is removed from water by boiling and is termed temporary hardness.

Noncarbonate hardness is the difference between the hardness calculated from the total amount of calcium and magnesium in solution and the carbonate hardness. If the carbonate hardness (expressed as calcium carbonate) equals the amount of calcium and magnesium hardness (also expressed as calcium carbonate) there is no noncarbonate hardness. Noncarbonate hardness is about equal to the amount of hardness remaining after water is boiled. The scale formed at high temperatures by the evaporation of water containing noncarbonate hardness commonly is tough, heat resistant, and difficult to remove.

Although many people talk about soft water and hard water, there has been no firm line of demarcation. Water that seems hard to an easterner may seem soft to a westerner. The Geological Survey has adopted the following classification:

<u>Hardness range (calcium carbonate in ppm)</u>	<u>Hardness description</u>
0-60	Soft
61-120	Moderately hard
121-180	Hard
more than 180	Very hard

For public use, water with hardness about 200 ppm generally requires softening treatment (Durfor and Becker, 1964).

Sodium-adsorption ratio (SAR)

The term "sodium-adsorption ratio (SAR)" was introduced by the U.S. Salinity Laboratory Staff (1954). It is a ratio expressing the relative activity of sodium ions in exchange reaction with soil and is an index of the sodium or alkali hazard to the soil. Sodium-adsorption ratio is expressed by the equation:

$$SAR = \frac{Na^+}{\sqrt{\frac{Ca^{++} + Mg^{++}}{2}}}$$

where the concentrations of the ions are expressed in milliequivalents per liter (or equivalents per million for most irrigation waters).

Waters are divided into four classes with respect to sodium or alkali hazard: low, medium, high, and very high, depending upon the SAR and specific conductance. At a conductance of 100 micromhos per centimeter the dividing points are at SAR values of 10, 18, and 26; but at 5,000 micromhos the corresponding dividing points are SAR values of approximately 2.5, 6.5, and 11. Waters range in respect to sodium hazard from those which can be used for irrigation on almost all soils to those which are generally unsatisfactory for irrigation.

Specific conductance (micromhos per centimeter at 25°C)

Specific conductance is a convenient, rapid determination used to estimate the amount of dissolved solids in water. It is a measure of the ability of water to conduct an electrical current. Commonly, the amount of dissolved solids (in parts per million) is about 65 percent of the specific conductance (in micromhos). This relation is not constant from well to well and it may even vary in the same source with changes in the composition of the water (Durfor and Becker, 1964).

Specific conductance of most waters in the eastern United States is less than 1,000 micromhos, but in the arid western parts of the country, a specific conductance of more than 1,000 micromhos is common.

Hydrogen-ion concentration (pH)

Hydrogen-ion concentration is expressed in terms of pH units. The values of pH often are used as a measure of the solvent power of water or as an indicator of the chemical behavior certain solutions may have toward rock minerals.

The degree of acidity or alkalinity of water, as indicated by the hydrogen-ion concentration, expressed as pH, is related to the corrosive properties of water and is useful in determining the proper treatment for coagulation that may be necessary at water-treatment plants. A pH of 7.0 indicates that the water is neither acid nor alkaline. Readings progressively lower than 7.0 denote increasing acidity and those progressively higher than 7.0 denote increasing alkalinity. The pH of most natural ground waters ranges between 5.5 and slightly more than 8.

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TABLE 1.--Records of wells, springs, and test holes

Depth of well: Measured depths are given in feet and tenths or hundredths, reported depths in feet, below land surface.

Type of well: B, bored; Dr, drilled; Du, dug; Dv, driven; Sp, spring.

Depth to water: Measured depths are given in feet and tenths or hundredths, reported depths in feet, below land surface.

Use of water or well: D, domestic; I, irrigation; Ind, industrial; O, observation, water levels shown in table 2; PS, public supply; S, stock, T, test hole; U, unused.

Aquifer: Kd, Dakota Group; Kp, Pierre Formation; Qd, glacial drift and associated sand and gravel deposits; Qev, Elk Valley delta sand and gravel deposits; Qla, Lake Agassiz silt, sand, and gravel deposits.

Depth to bedrock: Maximum depth at which palatable water may be obtained.

Remarks: C, chemical analysis is shown in table 4; L, log of test hole or well shown in table 3; flow rates were measured unless shown as reported.

51

Location number	Owner or name	Depth of well (feet)	Diameter or size (inches)	Type	Date completed	Depth to water below land surface (feet)	Date of measurement	Use of water or well	Aquifer	Depth to bedrock (feet)	Specific conductance (micromhos at 25°C)	Altitude of land surface (feet)	Remarks
<u>149-49</u>													
7dgd	Test Hole 2669	270	4	Dr	1967	..	....	T	..	268	.....	852	L
16cca	Tom Ocson	172	2	Dr	1943	11	....	D	Qd	...	.....	.....
20bba	Ira Knutson	21.4	24	Du	....	8.66	7-26-64	O	Qla	...	.....	856	C
31bab	Wm. Wilson	165	..	Dr	1958	9	....	U	Qd	...	.....	.....
32aaa	Test Hole 2617	273	5	Dr	1966	..	....	T	..	242	.....	860	L
33ddb	Elroy Gohdes	187	2	Dr	1959	25	....	D,S	Qd	...	.....	.....
34caa	Melvin Sondreal	180	2	Dr	1944	40	....	D	Qd	...	.....	.....
<u>149-50</u>													
2bbb	Morris Duckstad	150	2	Dr	1937	20	....	U	Qd	...	.....	.....
5cdc	Leonard Sorbo	295	2	Dr	1929	..	....	S	Qd	...	.....	.....
5dcd	George Amble	235	2	Dr	1935	16	....	S	Qd	...	.....	.....
7cdc	Test Hole 2672	315	4	Dr	1967	..	....	T	..	310	.....	874	L
8daa	Kenneth Tweten	315	2	Dr	1925	12	....	S	Qd	...	.....	.....
10cba	Orlando Johnson	40	48x48	Du	....	..	....	S	Qla	...	.....	.....

Location number	Owner or name	Depth of well (feet)	Diameter or size (inches)	Type	Date completed	Depth to water below land surface (feet)	Date of measurement	Use of water or well	Aquifer	Depth to bedrock (feet)	Specific conductance (micromhos at 25°C)	Altitude of land surface (feet)	Remarks
<u>149-50, Cont.</u>													
11ccc	Test Hole 2616	321	5	Dr	1966	..	....	T	..	315	.....	860	L
14cbc	Oscar Mahlun	140	2	Dr	....	..	....	S	Qd	...	.....	.....
15aaa	Russel Jenson	330	2	Dr	....	..	....	S	Qd	...	.....	.....
15bbd	E. Fladeland	280	2	Dr	....	..	....	S	Qd	...	.....	.....
15ccb	E. H. Fladeland	20	20	Du	1934	..	....	D,S	Q1a	...	.....	.....
16bbc	Trygve Syverson	285	2	Dr	....	5	....	S	Qd	...	.....	.....
17aaa	Russel Tweten	336	2	Dr	....	10	....	S	Qd	...	.....	.....
17ccc	Ole Sannes	120	2	Dr	....	..	....	S	Qd	...	.....	.....
18aab	Sam Loyland	170	2	Dr	....	..	....	S	Qd	...	.....	.....
18bba	Dora Cunningham	477	2	Dr	....	14	....	S	Qd	...	.....	.....
18dcd	Torville Evenstad	15	96	Du	....	8	....	D,S	Q1a	...	.....	.....
20ccd	Chester Haugen	208	2	Dr	....	Flow	7-17-61	S	Kd	...	.....	882	
21cdd	Einar Saure	320	2	Dr	1959	4	....	S	Kd	...	.....	.....
23abb	Gilbert Gulson	182	2	Dr	....	30	....	S	Qd	...	.....	.....
26acc	Alma Peterson	335	2	Dr	....	..	....	S	Qd	...	.....	.....
29ddd	Lazur Bros.	230	2	Dr	....	Flow	7-17-61	S	Kd	...	.....	881	
30ccd	Bert Monson	140	2	Dr	....	Flow	7-17-61	S	Kd	...	.....	906	
31bbc	Norman Iverson	170	2	Dr	....	Flow	7-31-61	S	Kd	...	5,842	895	C
31dcc	Martin Olson	11	48	Du	1961	..	....	S	Qa1	...	.....	908	
33bbb	Test Hole 8656	200	5	Dr	1961	Flow	12- 1-61	T	Kd	...	5,770	881	C
33dcd	Alice Rambeck	255	2	Dr	....	Flow	7-13-61	S	Kd	...	.....	881	
35ccd	Jelsness Bros.	154	2	Dr	1921	17	....	S	Q1	...	.....	.....
36cbb	Clifford Peterson	205	2	Dr	1935	..	....	S	Qd	...	.....	.....
<u>149-51</u>													
1aab	Test Hole 2618	158	5	Dr	1966	..	....	T	..	...	.....	.....	L
2aaa	Howard Moen	285	2	Dr	1952	..	....	S	Qd	...	.....	.....
3bbb1	E. H. Seig	13	14	Du	....	8	....	D	Qd	...	.....	.....
3bbb2	do.	185	2	Dr	....	Flow	7-10-64	S	Kd	...	.....	901	Flows 1.9 gpm, C

3cbc	Duane Winters	190	..	Dr	....	Flow	7-10-64	S	Kd	...	.....	906	Flows 0.7 gpm
3dad	D. Schumacher	390	2	Dr	....	Flow	7-10-64	S	Kd	...	.....	895	
4cbb	Leonard Myers	140	3	Dr	1953	20	....	S	Q1	...	.....	.....	C
7ada	Ernest Knutson	160	3	Dr	1930	6	....	S	Q1	...	.....	.....	C
10dcc	Joe Adams	425	2	Dr	....	Flow	7-18-61	S	Kd	...	.....	908	
11ddd	do.	380	2	Dr	....	4	....	S	Kd	...	.....	.....
14aaa	P. H. Schumacher	125	2	Dr	....	Flow	7-17-61	S	Kd	...	.....	894	Flows 1.0 gpm
15aaa	Fred Adams	125	2	Dr	....	Flow	7-17-64	S	Kd	...	.....	906	
15bab	Test Hole 2622	378	5	Dr	1966	..	....	T	..	322	.....	910	L
15cdd	Francis Schreiner	274	3	Dr	1947	Flow	7-18-61	S	Kd	...	.....	913	Flows 1.0 gpm
19dad	M. W. Murray	200	2	Dr	....	15	....	S	Qd	...	.....	.....
20ccb	Henry Nelson	91	24	B	1935	30	....	S	Qd	...	.....	.....
22aaa	James Adams	265	2	Dr	1959	Flow	7-17-61	S	Kd	...	.....	911	
22cbc	H. J. Adams	357	2	Dr	1946	6	....	S	Kd	...	.....	.....
23ddd	George Adams	340	3	Dr	1915	10	....	S	Kd	...	.....	.....
24cdd	Adams Bros.	140	3	Dr	1963	12	....	S	Kd	...	4,940	903	C
25cdc	James Schaffer	415	2	Dr	1956	Flow	7-18-61	S	Kd	...	8,067	918	C
26ccb	Kenneth Adams	160	2	Dr	1930	Flow	7-18-61	S	Kd	...	.....	920	
27add	John A. Adams	173	2	Dr	1940	Flow	7-18-61	S	Kd	...	.....	920	
28ada	Eugene Adams	288	2	Dr	1958	Flow	7-17-61	S	Kd	...	.....	936	
29aba	H. W. Strutz	82.7	36	B	....	10.56	7-27-67	O	Qd	...	.....	949	
30aab	Peter Lee	105	3	Dr	1946	12	....	S	Qd	...	.....	.....
30cdd	Ole Lee	18	36	Du	....	12	....	D	Qd	...	.....	.....
32dda	Joe Breidenback	325	2	Dr	....	10	....	S	Kd	...	.....	.....
33aad	F. C. Holiday	180	3	Dr	1961	10	....	S	Qd	...	.....	.....
<u>149-52</u>													
2daa	M. H. Roeder	114	3	Dr	1959	12	....	S	Qd	...	.....	.....
5dcc	Test Hole 2393	42	5	Dr	1965	2.61	8-23-65	T,O	Q1a	...	1,160	.....	L, C
8cbd	Leslie Gensrich	11.6	60x60	Du	1960	7.27	7- 9-64	D,S	Q1a	...	.....	.....
9aab	E. W. Nienas	17.3	36	Du	....	11.27	7- 9-64	D	Q1a	...	.....	.....
11ccb	Marvin Hjelmsstad	98	4	Dr	1961	50	....	D,S	Qd	...	.....	.....
13acb	Arthur Fischer	100	18	B	1944	40	....	S	Qd	...	.....	.....	C
16bbc	Lockerd Thompson	9.7	60	Du	....	2.73	6- 7-66	U	Q1a	...	.....	.....
16bcc	do.	9.5	48x48	Du	....	6.13	7-27-64	O	Q1a	...	.....	.....
21ccd	C. G. Anderson	230	3	Dr	1918	40	....	U	Qd	...	.....	.....	C
22cdd	Henry Beine	20	..	Du	....	12	....	S	Q1a	...	1,990	.....	C

Location number	Owner or name	Depth of well (feet)	Diameter or size (inches)	Type	Date completed	Depth to water below land surface (feet)	Date of measurement	Use of water or well	Aquifer	Depth to bedrock (feet)	Specific conductance (micromhos at 25°C)	Altitude of land surface (feet)	Remarks
<u>149-52, Cont.</u>													
26cdc	Earl Lenz	158	3	Dr	1961	30	....	S	Qd	...	.....	.....
27cac	Fred Lang	119	4	Dr	1952	40	....	S	Qd	...	.....	.....
28aaa	Hjelmstad Bros.	120	3	Dr	1955	60	....	S	Qd	...	.....	.....
28ccc	Edwin Hjelmstad	120	3	Dr	....	10	....	U	Qd	...	.....	.....
29dcc	C. G. Anderson	340	3	Dr	....	..	....	U	Kd	...	.....	.....
30aad	Earl Olson	20	60	Du	....	12	....	D,S	Q1a	...	.....	.....
30ccc	Anderson Bros.	14.0	48	Du	....	7.02	10-14-65	U	Q1a	...	.....	.....
31ccb	Gilbert Sorlien	16	30	Du	1963	4	....	D,S	Q1a	...	.....	.....
33ddc	Elmer Hjelmstad	465	2	Dr	1916	65	....	U	Kd	...	.....	.....
<u>149-53</u>													
1aaa	Thoralf Suby	38	26	B	1952	19	....	D	Qd	...	.....	.....
2bcc	Elsie Kleyberg	12.5	48	Du	....	5.20	7- 8-64	D	Qev	...	.....	.....
3bbb	Theo. Maundt	15	36	Du	1929	8	....	D	Qev	...	.....	.....
3cbb	Olga Aaland	36	48	Du	....	12	....	D	Qev	...	.....	.....
9ccc	Test Hole 2391	168	5	Dr	1965	7.61	8-23-65	T,O	Qev	...	.....	.....	L
11bdc	Otis Stendahl	11.5	48	Du	....	9.35	4-29-60	D	Qev	...	.....	.....
11dcc	Clarence Dokken	30	36	Du	....	26	....	D,S	Qev	...	.....	.....
13ccc	J. M. Bjerke	20	24	Du	....	10	....	D	Qev	...	.....	.....
14baa	Test Hole 2392	326	5	Dr	1965	..	....	T	..	292	.....	.....	L
15bba	Chester Offerdahl	22.4	60	Du	....	12.03	7- 8-64	S	Qev	...	.....	.....
15dcc	J. W. Grinager	24.3	24	Du	....	11.70	7-27-64	O	Qev	...	1,460	.....	C
17dca	Corlis Swenson	30	..	Du	1948	24	....	S	Qd	...	.....	.....
23ddd	Emma Rydland	20.2	48	Du	....	12.47	4-29-60	D,S	Qev	...	.....	.....
24bbb	M. G. Rydland	17.7	48	Du	....	5.80	7- 8-64	D	Qev	...	.....	.....
24dcc	H. F. Anderson	25	36	Du	....	15	....	D,S	Qev	...	.....	.....
25cdd	Roy Knutson	60	36	Du	....	54	....	D	Qev	...	.....	.....
26dcc	Martha Landa	12.8	24	Du	....	5.18	7- 8-64	O	Qev	...	.....	.....
28ccc	Test Hole 762-3	283	5	Dr	1965	33.94	8-12-65	T,O	Qd	264	1,410	.....	L, C

28cdc	Test Hole 762-11	210	5	Dr	1965	..	....	T	..	190	1,410	.....	L
28cdd	Test hole 762-5	231	5	Dr	1965	..	....	T	..	213	.....	.....	L
29aaa	Al Stemmo	27	60	Du	....	18	....	S	Qd	...	.....	.....
29acd	Test hole 762-13	252	5	Dr	1965	..	....	T	..	...	.....	.....	L
32aba	Odin Johnson	22	60	Du	....	16	....	S	Qev	...	.....	.....
32dad	Test Hole 762-6	252	5	Dr	....	..	....	T	..	235	.....	.....	L
33baa	Martin Hanson, Jr.	27.9	48	Du	....	17.53	....	D,S	Qd	...	.....	.....
33bab	Wayne Thompson	186	4	Dr	1962	35	....	D,S	Qd	...	1,140	.....	C
34bba	Ed Smestad	16	72	Du	1944	8	....	D	Qev	...	.....	.....
<u>149-54</u>													
1acc	Morrison Farm	13.46	36x36	Du	....	11.58	4-29-60	U	Qev	...	.....	.....
2cdd	Test Hole 2595	304	5	Dr	1966	..	....	T	..	278	.....	.....	L
4aba	Alvin Halverson	32	30	B	1954	30	....	D,S	Qev	...	.....	.....
4cce	Test Hole 2398	84	5	Dr	1965	3.47	9- 5-65	T,O	..	...	1,090	.....	L, C
6acc	Perden Halverson	27	48x48	Du	....	19	....	S	Qev	...	.....	.....
6dce	Gilmore Ostlie	32	36	B	1956	30	....	D	Qev	...	.....	.....
8ddc	Graven Hogen	24	36	B	....	20	....	S	Qev	...	.....	.....
9acb	Northwood	165	8	Dr	1960	35.81	9- 2-66	O	Qd	...	.....	.....
9bdd1	Northwood No. 3	164	12	Dr	1960	89	....	PS	Qd	...	1,660	.....	C
9bdd2	Northwood No. 1	165	12	Dr	....	140	....	PS	Qd	...	.....	.....	L
9dac1	Northwood No. 4	52	12	Dr	1962	10.60	7-12-62	PS	Qev	...	1,620	.....	L, C
9dac2	Northwood No. 2	53	12	Dr	....	35	....	PS	Qev	...	1,520	.....	C
10bcc	Nels Thompson	10.3	36x36	Du	....	.20	4-29-60	U	Qev	...	.....	.....
11add	Bob Hanson	15.9	..	Du	1948	6.80	4-29-60	S	Qev	...	.....	.....
11caa	do.	20.0	36x36	Du	1948	13.77	4-29-60	S	Qev	...	.....	.....
15bbb	P. J. Schweitzer	9.2	48x48	Du	....	.20	4-29-60	U	Qev	...	.....	.....
17aac	Edwin Burwas	25	48x48	Du	1910	10	....	U	Qev	...	.....	.....
18dbd	P. O. Johnson	219	5	Dr	1934	35	....	U	Qd	...	.....	.....
21bbb	Henry Haga	21.1	36	B	....	14.42	....	D	Qev	...	.....	.....
22aab	Test Hole 2536	53	5	Dr	1966	..	....	T	..	...	.....	.....	L
22ddd	Hjalmer Stephenson	200	..	Dr	1940	..	....	D	Qev	...	.....	.....
23bcc	Mrs. J. Halverson	17	48x48	Du	1959	14	....	D,S	Qev	...	.....	.....
28abb	Olaf Jorde	16	18	B	1956	14	....	S	Qev	...	.....	.....
29adb	Orville Bakken	28	48	B	1916	21	....	D,S	Qev	...	.....	.....
30abb	Percy Foss	46	36	B	1955	40	....	S	Qev	...	.....	.....
30ccd	Mrs. K. E. Thorsgard	45	30	B	1937	20	....	D,S	Qev	...	.....	.....
31aad	L. P. Thompson	55	24	B	1945	20	U	Qev	
32acc	Noel Korsmo	30	30	B	1936	22	U	Qev	

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<u>149-55</u>													
6bcd	Mern Wall	32.4	48	Du	19.12	7- 7-64	S	Qd	
7aba	Thorsgard Bros.	27.4	18	B	13.20	9- 2-66	O	Qd	...	740	C
9baa	Elmer Olson	32	36	B	1939	17	....	D,S	Qd	...	.....	.....
9dcd	Bert Morkve	27	30	Du	1944	10	....	S	Qd	...	.....	.....
11cdc	Alvin Olson	25	40	Du	...	12	....	D,S	Qd	...	.....	.....
13aac	Anton Ostmo	31.2	48x48	Du	....	11.94	5- 5-60	D	Qd	...	.....	.....
14bab	Johnson Bros.	20	48x48	Du	....	12	5- 5-60	D,S	Qd	...	.....	.....
17dbb	Ben Wasness	40	48x48	Du	1925	32	....	D,S	Qd	...	.....	.....
18cab	Osland Bros.	30	30	Du	1900	..	....	D	Qd	...	.....	.....
19daa	Art Christianson	19.6	30	Du	....	15.26	7- 7-64	U	Qd	...	.....	.....
21ddc	Jerome Kjorven	40	30	Du	....	10	....	S	Qd	...	.....	.....
23caa	Henry Evanson	25	48	Du	....	14	....	D,S	Qd	...	.....	.....
26baa	O. G. Olson	26.5	48	Du	....	7.75	5- 5-60	U	Qd	...	.....	.....
29cdb	Ray Bullert	45	30	B	....	23	....	D,S	Qd	...	.....	.....
32abb	Test Hole 2594	84	5	Dr	1966	..	....	T	..	64	.....	.....	L
33bbc	Helmer Mauseth	28	36	Du	1890	24	....	S	Qd	...	.....	.....
<u>149-56</u>													
1ddd	John Huso	45	..	Dr	....	20	....	S	Qd	...	.....	.....
2abb	Adolph Kordahl	49.85	36	Du	....	19.80	7-13-64	U	Qd	...	.....	.....
5bab	Walter Pratt	38	36	Du	1938	23	....	D,S	Qd	...	.....	.....
7ada	John Engen	21.25	36	Du	1930	11.20	7- 7-64	S	Qd	...	.....	.....
9ddd	Lowell Mutchler	36	48	Du	....	16	....	S	Qd	...	.....	.....
12cbb	Mern Wall	40	..	Du	....	20	....	S	Qd	...	.....	.....
13cdc	P. A. Peterson	48	36x36	Du	1917	30	....	D,S	Qd	...	.....	.....
17cdd	Kenneth Haugen	60.11	36	Du	....	24.00	7- 6-64	D	Qd	...	.....	.....
18cdc	Otto Skurdahl	33	48	Du	1920	33	....	S	Qd	...	.....	.....
20ccd	Vern Tangen	30	36	Du	1900	17	....	D,S	Qd	...	.....	.....
23ddc	Berthold Uglem	28.2	36	Du	....	13.03	7- 7-64	O	Qd	...	.....	.....
25dcc	Arvid Tangen	12	30	Du	....	4	....	D,S	Qd	...	.....	.....

	26bcd	Parnell Uglem	20	30	Du	....	10	....	D	Qd	....	....	....
	31aac	Harold Solem	30	36	Du	1963	2	....	S	Qd	....	....	....
	34cdc	Dean Bentley	30.6	48	Du	....	9.49	7- 6-64	U	Qd	....	....	....
	<u>150-50</u>													
	2acd	Fladeland Bros.	30	36	Du	....	15	....	U	Q1a	....	....	....
	5aad	Harry Earl	160	4	Dr	....	30	....	S	Qd	....	....	....
	7ccd	Test hole 2612	157	5	Dr	1966	..	....	T	..	....	....	....	L
	9add	Test hole 2613	305	5	Dr	1966	14.29	9-30-66	S	..	265	....	....	L
	11add	Gilmor Kjorvestad	30	36	Du	....	5	....	S	Q1a	....	5,970	....
	17cdd	O. Sylvester	20.0	30	Du	....	4.75	7-23-64	D	Q1a	....	....	....
	17acc	Test Hole 2673	330	4	Dr	1967	..	....	T	..	275	....	854	L
	23aaa1	H. A. Loiland	200	4	Dr	....	10	....	U	Qd	....	2,660	....	C
	23aaa2	Test Hole 2614	226	5	Dr	1966	..	....	T	..	....	....	....	L
	23bab	J. L. Amble	36	24	B	1940	21	....	U	Q1a	....	....	....
	25aab	Test Hole 2674	270	4	Dr	1967	..	....	T	..	244	....	847	L
	26caa	H. N. Loiland	312	4	Dr	1919	12	....	S	Qd	....	....	....
	28aaa	Test Hole 2615	275	5	Dr	1966	15.89	9-30-66	T	..	....	....	....	L, C
	28bbb	J. L. Amble	36	24	B	1955	21	....	D	Qd	....	....	....
	28ddd	Test Hole 2668	272	4	Dr	1967	..	....	T	..	239	....	856	L
	29ddd	Test Hole 2396	126	5	Dr	1966	..	....	T	..	....	....	....	L
	30baa	W. E. Block	100	4	Dr	1950	6	....	S	Qd	....	....	....
	32bbd	Emma Bohlman	22	48x48	Du	....	11.30	7-27-64	O	Q1a	....	....	....
	32cbc	Leonard Gaulke	400	3	Dr	1934	10	....	U	Qd	....	....	....	C
	36dcd	Ole Kvasager	200	..	Dr	....	10	....	S	Qd	....	3,880	....
	<u>150-51</u>													
	1bbb	Test Hole 2432	378	5	Dr	1965	..	....	T	..	374	....	852	L
	1dcd	Leo Gregorie	18	36	Du	....	6	....	S	Q1a	....	1,215	....
	4aba	Knute Kjemhas	250	3	Dr	1954	Flow	7-20-64	S	Kd	....	....	861	Flows 0.4 gpm
	6ddc	Chas. Willert	160	2	Dr	....	Flow	7-19-64	S	Kd	....	....	882	Flows 1.0 gpm
	8bbb	Milton Burkland	170	4	Dr	....	Flow	10-12-66	S	Kd	....	....	877	C
	8ccc	Test Hole 2610	154	5	Dr	1966	..	....	T	..	150	....	887	L
	8dad	Ed Uhler	15	36	Du	1956	5	....	D	Qd	....	3,861	....
	9daa	Harold Mayers	185	4	Dr	....	Flow	7-20-64	S	Kd	....	....	869	Flows 0.6 gpm
	10abb	A. Gregorie	110	4	Dr	1900	Flow	7-20-64	S	Kd	....	....	863	Flows 1.1 gpm
	13cca	John Tannahill	12	36	Du	....	6	....	D,S	Q1a	....	1,144	....
	14caa	Ed Gregorie	13.65	36	Du	....	9.44	7-20-64	U	Q1a	....	....	....	L
	15aaa	Test Hole 2611	147	5	Dr	1966	T	..	112	865	L
	18baa	Peterson Estate	140	3	Dr	1961	Flow	7-19-64	S	Kd	900	C

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<u>150-51, Cont.</u>													
19bba	Ed Shinnick	140	2	Dr	1962	Flow	7-19-64	S	Kd	903	Flows 0.7 gpm
20abal	Tony Szepelak	20	36	Du	1962	8	D	Qd	...	6,153	
20aba2	do.	315	2	Dr	....	Flow	7-19-64	S	Kd	...	.....	900	Flows 2.1 gpm
22baa	John Szepelak	30	23	Du	....	10	....	D	Qd	...	.....	.....
25bba	Ed Kovnick	360	3	Dr	1939	Flow	7-19-64	U	Kd	...	.....	872	
26abc	Reginald West	332	3	Dr	1948	Flow	10-12-66	S	Kd	...	.....	875	Flows 0.7 gpm, C
26cdc	Elroy Eichhorst	320	3	Dr	1953	Flow	7-19-64	S	Kd	...	.....	880	
27ccc	Test Hole 2621	283	5	Dr	1966	..	....	T	..	224	.....	893	L
27ddd	Test Hole 2397	357	5	Dr	1965	..	....	T	..	325	.....	885	L
30ccc	Test Hole 2394	42	5	Dr	1965	..	....	T	..	...	.....	.....	L
30cdd	Berto Hovet	7.7	48	Du	....	4.85	7-19-64	U	Qd	...	.....	.....
30ddd	Test Hole 2620	220	5	Dr	1966	..	....	T	..	190	.....	913	L
31bab	Berto Hovet	12	24	Du	....	4	....	S	Qd	...	4,280	.....	C
32aaa	W. H. Miller	108	3	Dr	1944	Flow	7-19-64	S	Kd	...	.....	903	
33ccc	Jim Robinson	180	..	Dr	....	Flow	7-19-64	S	Kd	...	.....	906	Flows 2.1 gpm, C
34aaa	Ernest Eichhorst	120	3	Dr	....	Flow	7-19-64	S	Kd	...	6,970	885	C
36aaa	Test Hole 2395	147	5	Dr	1965	3.05	9- 6-66	T,O	..	...	7,100	864	L, C
<u>150-52</u>													
4aaa	Ralph Sauer	27.4	48	Du	....	.35	5- 5-66	U	Qd	...	.....	.....	C
10bbb	James Lowe	165	..	Dr	1952	12	....	S	Qd	...	.....	.....	C
16cdc	Fairfield Twp.	9.5	12	B	....	6.34	7-16-64	O	Q1a	...	597	948	C
17bba	Arnold Leake	120	3	Dr	1934	30	....	D,S	Qd	...	.....	.....
18ccc	Jacob Bakke	12.0	36x36	Du	....	5.39	9- 9-66	D	Q1a	...	.....	.....	C
18dcd	Emmet Johnston	14	48	Du	1916	6	....	D	Q1a	...	895	.....
21dbb	Ira Peterson	16.6	24	B	....	5.82	7-16-64	U	Q1a	...	.....	.....
23ccc	Mrs. Elroy Schroeder	80	4	Dr	1961	30	....	S	Qd	...	.....	.....	C
25cdd	Paul Raider	90	3	Dr	1954	12	....	S	Qd	...	.....	.....	C
28add1	Halvor Nygaard	13	36	Du	....	10	....	D	Q1a	...	.....	.....

28add2	do.	410	2	Dr	....	..	....	U	Kd	...	.....	.....
31bbb	Orphie Dahl	30	36	Du	....	15	....	U	Qd	...	.....	.....
31ddd	Jorgen Camperud	15.8	36	Du	....	11.77	7-19-64	S	Qd	...	.....	.....	C
32ccc	Art Bar	16	36	Du	....	8	....	D	Qla	...	.....	.....
33ccc	Halvor Hygaard	12	36	Du	....	7	....	S	Qla	...	.....	.....
34bbb	Test Hole 2619	252	5	Dr	1966	..	....	T	..	222	.....	955	L
34bcb	Ida Meyers	90	..	Dr	1918	20	....	S	Qd	...	6,355	.....
35dab	Ezra Schroeder	85	4	Dr	1934	15	....	S	Qd	...	.....	.....
<u>150-53</u>													
1daa	Frank Nienas	20	10	Du	....	10	....	D	Qla	...	1,093	.....
2dca	G. Holweger	19	36	Du	....	18	....	D,S	Qla	...	.....	.....	C
4abb	Fritz Holweger	160	4	Dr	1950	130	....	S	Qd	...	.....	.....	C
6dab	Chester Bakke	8.8	36	Du	....	7.25	7-15-64	S	Qev	...	.....	.....
7aab	Test Hole 2400	116	5	Dr	1965	..	....	T	..	...	.....	1,095	L
7cbb	Julius Holweger	14	36	Du	1956	8	....	D	Qev	...	.....	.....
7daa	Pleasant View Twp.	8.8	36	Du	....	5.57	9- 1-66	O	Qev	...	.....	1,087	C
11cbb	Henry Maier	128	6	Dr	1957	30	....	D,S	Qd	...	.....	.....	C
13ddd1	Maynard Fischer	24	48	Du	....	16	....	S	Qev	...	.....	.....	C
13ddd2	do.	110	3	Dr	1952	25	....	S	Qd	...	.....	.....	C
14cbb	Curtis Hagert	365	3	Dr	1926	60	....	U	Kd	...	.....	.....
14ddd	Willard Bergsrud	190	4	Dr	....	165	....	S	Qd	...	.....	.....
16bca	Anna Swenson	9.2	48	Du	1925	7.00	7-16-64	U	Qev	...	.....	.....
19bcc	S. H. Evanson	15	18	B	1961	7	7-15-64	D	Qev	...	.....	.....
21aba	Peterson Estate	14.0	60	Du	....	4.67	9- 1-66	O	Qev	...	.....	.....
22bbb	C. Christopher	12	72	Du	1914	8	....	D,S	Qev	...	.....	.....
24daa	L. Christopher	133	4	Dr	1922	60	....	D	Qd	...	.....	.....
29bac	Oscar Algren	20	36	Du	....	6	....	S	Qev	...	1,193	.....
33bcb	H. G. Hanson	20	36	Du	....	12	....	D	Qev	...	.....	.....
35dbd	Mrs. E. Vance	20	36	Du	....	18	....	D,S	Qd	...	.....	.....
<u>150-54</u>													
1ccc	Ed Holweger	21	36	Du	1955	15	....	S	Qev	...	.....	.....
1dda	Test Hole 2399	346	5	Dr	1965	..	....	T	..	303	.....	1,105	L
2ccc	Bilden Bros.	18.9	36	Du	....	12.50	9- 2-66	O	Qev	...	.....	.....
4aaa	Test Hole 2531	84	5	Dr	1966	..	....	T	..	...	.....	1,117	L
4ccd	Test Hole 2401	126	5	Dr	1965	5.48	9- 1-65	T,O	Qev	...	.....	1,127	L
5bbb	E. F. Moore	25	30	Du	1924	15	....	S	Qev	...	.....	.....
6dcd	Ed Pazderic	30	36	Du	1949	12	D,S	Qev	
7bbb	Test Hole 2402	73	5	Dr	1965	7.29	9- 1-65	T,O	Qev	1,125	L

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150-54, Cont.													
7cdd1	Kempton	40	36	Du	D	Qev	...	757	C
7cdd2	O. L. Cannon	27	36	Du	1964	15	D	Qev	...	1,660	C
7dbc	Great Northern Railway	42.5	6	Dr	1929	10	....	S	Qev	...	.....	1,124	L
7dcc	Henry Bros.	15	..	Du	....	12	....	S	Qev	...	.....	.....
8abb	Test Hole 2593	284	5	Dr	1966	..	....	T	..	262	.....	1,123	L
9ada	Francis Schol	20	36	Du	1939	10	....	S	Qev	...	.....	.....
10aaa	Test Hole 2534	73	5	Dr	1966	..	....	T	..	...	.....	1,121	L
11dcd	Arlie Peterson	20	36	Du	1949	18	....	D	Qev	...	.....	.....
14bcb	Chester Krabbenhoft	13.7	36	Du	....	5.58	....	U	Qev	...	.....	.....
17abd	E. Peterson	13.5	48x48	Du	....	8.95	7-15-64	S	Qev	...	2,432	.....
19aaa	Test Hole 2533	63	5	Dr	1966	..	....	T	..	...	.....	1,123	L
19ida	Royce Dean	15.9	36	Du	....	11.55	7-15-64	D	Qev	...	.....	.....
23ccc	L. Maristuen	9.5	36	Du	1931	9.20	7-15-64	S	Qev	...	.....	.....
24bcb1	H. Oppedal	18	..	Du	....	10	....	D	Qev	...	1,166	.....
24bcb2	do.	175	24	B	1930	20	....	U	Qev	...	.....	.....
24daa	Test Hole 2535	63	5	Dr	1966	..	....	T	..	...	.....	1,098	L
30aaa	Avon School	15.6	12	Du	....	10.13	7-28-64	PS	Qev	...	1,570	.....	C
150-55													
1dda	Francis Hofer	12.7	42	Du	1938	9.55	7-14-64	S	Qev	...	1,300	.....
5cdc	R. Bohnenblust	20	36	Du	1894	17	....	D	Qd	...	.....	.....
8bbb	Test Hole 2592	74	5	Dr	1966	..	....	T	..	52	.....	1,248	L
9aaa	Andrew Gravidahl	40	36	Du	1962	4	....	S	Qd	...	.....	.....
10cda	Mrs. O. H. Nelson	44	36	Du	1934	22	....	D	Qd	...	.....	.....
11aba	Test Hole 2403	75	5	Dr	1965	..	....	T	..	...	.....	1,120	L
11ddd	John Maristuen	65	4	Dr	1963	12	....	D	Qd	...	.....	.....
13ddd	Halverson Bros.	13.0	42x42	Du	....	9.07	7-14-64	D	Qev	...	.....	.....
14baa	Brita Nygaard	9.5	36	Du	....	6.45	9- 2-66	O	Qd	...	.....	1,127	
14ddb	Mervin Olson	13.5	36	Du	1919	4.50	7-14-64	D	Qev	...	912	.....

17daa	Geo. E. Jones	46.7	30	Du	1930	7.50	7-14-64	U	Qd	...	.....	.....
20aad	Melvin Johnson	31.5	36	Du	....	16.90	7-14-64	S	Qd	...	5,184	.....
20ccc	Phil Gratton	32	36	Du	1931	21	....	D,S	Qd	...	.....	.....
22daa	J. Teggestad	21.7	30	Du	1913	12.80	7-14-64	S	Qla	...	.....	.....
25aab	Earl Wall	17.7	36	Du	....	12.56	5- 5-60	U	Qev	...	.....	.....
25ccc	E. Evanson	16.8	36	Du	1928	10.43	5- 5-60	D,S	Qev	...	.....	.....
28baa	Abner Jodock	48	36	Du	1933	34	....	D,S	Qd	...	2,344	.....
29daa	Grace Twp.	18.9	24	Du	....	5.91	9- 2-66	O	Qd	...	.....	1,218
31ddd	Clarence Hegre	28.3	36	Du	....	15.90	7-14-64	U	Qd	...	.....	.....
32aba	H. I. Anderson	64	40	Du	....	50	....	D,S	Qd	...	.....	.....
<u>150-56</u>												
lccd	Ed McCoy	38	24	B	1925	12	....	S	Kp	...	.....	.....
4dad	Francis Hofer	20.7	30	Du	....	16.73	7-13-64	D	Qd	...	.....	.....
5ddd	James Dahl	45	48	Du	....	25	....	D,S	Qd	...	.....	.....
7acd	Mrs. Ruth Carroll	31	24	Br	1963	10	....	D	Qd	...	.....	.....
10aaa	Harlan Temple	24.95	36	Du	....	8.77	7-13-64	U	Qd	...	.....	.....
13bba	Joseph Hofer	26	30	Du	1900	13	....	D	Qd	...	.....	.....
14dca	Cliff McCoy	35	28	Du	1910	25	....	D	Qd	...	.....	.....
15ccc	Logan Center Twp.	33.4	36x36	Du	....	7.93	9- 2-66	O	Kp	...	.....	.....
15cdd	C. E. Merrill	35	36	B	1960	28	....	D	Qd	...	1,852	.....
16add	Dudley Williams	24.6	..	Du	....	9.35	7-13-64	D,S	Qd	...	.....	.....
20cdd	Solvig Peterson	29.8	24	B	1929	8.60	9- 2-66	O	Qd	...	.....	.....
23ddd	Leonard Landman	45	36	Du	....	35	....	S	Qd	...	.....	.....
24daa	Archie Gabriel	52	24	B	1963	20	....	D	Qd	...	.....	.....
27baa	Louis Thompson	35.4	24	B	....	13.10	7-13-64	U	Qd	...	.....	.....
29bab	Beatrice Peterson	36.3	30	Du	....	15.95	7-13-64	U	Qd	...	.....	.....
29acc1	Carl Larsgaard	110	5	Dr	1917	20	....	S	Kp	...	2,855	.....
29acc2	do.	36.7	30	Du	....	14.67	7-13-64	S	Qd	...	.....	.....
30dcc	Murry McKenzie	35	36	Du	1938	25	....	S	Qd	...	.....	.....
35bcc	Alex McKenzie	28	36	Du	1927	16	....	D,S	Qd	...	.....	.....
<u>151-50</u>												
3cbd	Bridgeman Creamery	225	4	Dr	....	..	....	Ind	Qd	...	.....	833 L
4ccd	Bureau of Mines	306	6	Dr	1944	..	....	T	..	...	.....	831 L
5acd	Test Hole 2526	31	5	Dr	1966	10.04	6-30-66	T,O	..	...	2,980	830 L, C
5ccc	Great Northern Railway	148	6	Dr	1922	12	....	PS	Qd	...	.....	833 L
6ada	F. A. A.	140	3	Dr	1940	4.73	6-16-40	PS	Qd	...	.....	832 L
6dad	Test Hole 2433	294	5	Dr	1965	T	..	267	834 L
7ddd	Al Bringewatt	200	4	Dr	8	S	Qd

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<u>151-50, Cont.</u>													
15dca	Gordon Gronhovd	23	24	B	1955	8	D	Q1a	...	2,596	C
17abb	Test Hole 2676	320	4	Dr	1967	T	..	293	836	L
19cca	Walter Holm	200	2	Dr	1928	1	....	S	Qd	...	.....	.....
22bbb	Test Hole 2431	252	5	Dr	1965	Flow	9- 9-65	T	..	235	.....	833	L, well plugged
30aab	Test Hole 2675	285	4	Dr	1967	..	....	T	..	280	.....	840	L
30ddd	Grand Forks School Board	15.2	8	Du	....	5.38	9- 6-66	O	Q1a	...	.....	842	C
33add	Test Hole 2667	250	4	Dr	1967	..	....	T	...	217	.....	840	L
<u>151-51</u>													
2aba	John Fayette	300	..	Dr	1945	Flow	7-30-64	S	Kd	...	.....	835	Flows 0.3 gpm
2bbb	Test Hole 2434	219	5	Dr	1965	..	....	T	..	215	.....	841	L
3bbb	Geo. Saumer	108	2	Dr	1962	Flow	9- 1-65	S,O	Kd	...	6,170	842	Flows 2.14 gpm, C.
4ada	Test Hole 2439	158	5	Dr	1965	..	....	T	..	117	.....	844	L
4bbb	Test Hole 2608	73	5	Dr	1966	..	....	T	..	...	.....	845	L
4ccc	James Earl	275	2	Dr	1937	Flow	7-30-64	S	Kd	...	.....	846	
9ccc	N. F. Walsh	118	2	Dr	1903	Flow	7-30-64	U	Kd	...	6,258	847	Flows 0.5 gpm
10aaa	Henry Olufson	285	2	Dr	....	Flow	7-30-64	S	Kd	...	.....	842	Flows 0.2 gpm
10baa	H. E. Mahlum	121	2	Dr	1958	Flow	7-30-64	S	Kd	...	.....	844	Flows 1.9 gpm
11daa	Ed Lunski	324	2	Dr	1964	..	....	S	Qd	...	.....	841	
17adc	John Walsh	140	2	Dr	1940	Flow	7-30-64	U	Kd	...	.....	850	Flows 0.2 gpm
18aab	Wilson Ray	180	2	Dr	1961	Flow	7-30-64	S	Kd	...	.....	855	Flows 1.5 gpm
20dbd	Harry Hallick	140	2	Dr	1942	Flow	7-30-64	U	Kd	...	6,466	856	
30ada	Helmer Evenson	150	2	Dr	1950	Flow	7-30-64	S	Kd	...	.....	860	Flows 5.0 gpm
32bba	R. C. Clark	150	2	Dr	1939	Flow	7-30-64	S	Kd	...	.....	865	
32ddd	Milton Burkland	175	2	Dr	....	Flow	7-30-64	S	Kd	...	.....	864	Flow reported 2 gpm.
33aaa	C. W. Ekness	125	2	Dr	....	Flow	7-30-64	S	Kd	...	.....	854	Flows 1.0 gpm
<u>151-52</u>													
1aaa	Test Hole 2438	158	5	Dr	1965	..	....	T	..	132	.....	851	L
1bbc	Gerald Colbert	165	3	Dr	1938	Flow	7-29-64	S	Kd	...	.....	853	Flows 0.4 gpm

6aaa	Test Hole 2605	105	5	Dr	1966	..	....	T	..	...	.....	880	L
6bab	Test Hole 2437	210	5	Dr	1965	..	....	T	..	163	.....	890	L
6bcc	Harold Njaa	89	8	Dr	1962	..	....	PS	Qd	...	3,250	892	C
7dca	Art McGrath	108	4	Dr	1944	20	....	U	Qd	...	.....	.....
8caa	Wilmer McGrath	240	2	Dr	1949	Flow	7-29-64	S	Kd	...	.....	883	
10aaa	J. Pinkerton	210	2	Dr	1937	Flow	7-29-64	S	Kd	...	.....	862	Flows 4.0 gpm
11baa	Walter Roberts	100	2	Dr	....	Flow	7-29-64	U	Kd	...	14,923	858	Flows 1.2 gpm
12abb	R. E. Duncklee	70	2	Dr	1957	Flow	7-29-64	S	Kd	...	.....	856	Flows 0.04 gpm
14dcb	Iver Anderson	80	2	Dr	1940	Flow	7-29-64	S	Kd	...	.....	860	Flows 1.9 gpm
17bbb	Test Hole 2603	115	5	Dr	1966	..	....	T	..	...	.....	895	L
17dcc	Tom Dvorak	112	4	Dr	....	90	....	S	Qd	...	.....	.....
18dcc	Donald Finnie	90	36	B	1924	10	....	U	Qd	...	.....	.....
20abb	Lloyd Ovind	24.5	..	Dr	1914	6.28	9- 1-66	O	Qla	..	.....	906	
28bcb	Erik Sand	240	..	Dr	....	15	....	S	Kd	...	.....	.....
30baa	Gerald McGrath	140	4	Dr	1944	28	....	S	Qd	...	.....	.....
32caa	Roland Sieg	200	4	Dr	1954	20	....	S	Kd	...	.....	.....
33aaa	Ralph Sauer	22	36	Du	1930	10	....	D	Qla	...	2,150	.....	C
34ccd	Christopher Estate	18.3	48	Du	1920	11.94	9- 1-66	O	Qd	...	864	.....	C
36ccc	Dept. of Agriculture	167	5	Dr	1965	Flow	11- 3-65	T	Kd	...	.....	885	L
<u>151-53</u>													
1abb	Test Hole 2596	284	5	Dr	1966	..	....	T	..	...	.....	893	L
1bba	Test Hole 2410	126	5	Dr	1965	..	....	T	..	...	.....	902	L
1ecc	Test Hole 2604	116	5	Dr	1966	8.64	9-30-66	T	..	...	.....	915	L, C
1dcd	Great Northern Railway												
	No. 2	90	6	Dr	1958	10	....	PS	Qd	...	3,040	.....	L, C
7abb	Harold Holweger	400	4	Dr	....	90	....	S	Kd	...	.....	.....
12baa	Stanley Veitch	108	40	B	1907	20	....	S	Qd	...	3,180	.....
13aba	Herb Ovind	187	48	B	1937	4	....	U	Qd	...	.....	.....
15aaa	Scott No. 1 Larson	898	6	Dr	1954	..	....	T	..	...	.....	939	
17bbb	Mrs. B. Craft	112	18	B	1962	20	....	D	Qd	...	960	.....
19dda	Arthur Paupst	400	4	Dr	1944	40	....	U	Qd	...	.....	.....
21bcb	M. Mortinson	12	36	B	....	4	....	D	Qla	...	.....	.....
24ccb	.....	39.8	6	Dr	....	27.64	6-27-66	O	Qd	...	.....	935	
25abd	Allan Leake	116	3	Dr	1950	12	....	D	Qd	...	.....	.....
26cdd	Myra Foundation	390	3	Dr	1951	50	....	S	Qd	...	.....	.....
27aaa	J. Wiertzema	290	3	Dr	1929	40	....	D	Qd	...	2,700	.....
28bab	P. A. Goetz	60	16	B	....	20	....	S	Qd	...	.....	.....

Location number	Owner or name	Depth of well (feet)	Diameter or size (inches)	Type	Date completed	Depth to water below land surface (feet)	Date of measurement	Use of water or well	Aquifer	Depth to bedrock (feet)	Specific conductance (microhmhos at 25°C)	Altitude of land surface (feet)	Remarks
151-53, Cont.													
30cbb	Edgar Nelson	23.7	36	Du	....	18.00	7-28-64	S	Qd	...	733	.....
31ddd	Roger Schander	16.3	42	Du	....	6.92	7-28-64	D	Q1a	...	.....	.....
34ddc	.....	10.4	36	Du	....	2.12	9- 1-66	O	Q1a	...	558	993	C
151-54													
1dca	Village of Arvilla	14.8	36x36	Du	....	3.59	9- 2-66	O	Qd	...	.....	1,012	
2acc	Julius Drewlo	40	36	Du	1963	30	....	D,S	Qd	...	.....	.....
4bcb	Swen Lilja	23	36	Du	1962	10	....	D,S	Qev	...	.....	.....
5ccc	Test Hole 2443	42	5	Dr	1965	..	....	T	..	...	.....	1,125	L
6dad	O. E. Swave	22	36	Dv	....	..	....	U	Qev	...	703	.....	L
7cccl	City of Larimore No. 3	60	12	Dr	1960	24	....	PS	Qev	...	618	.....	C
7ccc2	City of Larimore No. 4	60	12	Dr	1964	24	....	PS	Qev	...	612	.....	C
10bbc	John McDonald	12	120	Du	1905	8	....	D,S	Qev	...	1,076	.....
11daal	Ralph Benson	30	36	B	1963	15	....	S	Qd	...	.....	.....
11daa2	do.	420	2	Dr	1930	..	....	U	Kd	...	.....	.....
13caa	Elk Valley Farms	41	12	B	1948	..	....	I	Qev	...	.....	.....
14add	Lindsey Hickman	16	36	Du	1946	10	....	S	Qev	...	.....	.....
15cdd	Rose Sweeney	12	12	Dv	....	6	....	D	Qev	...	703	.....
16aaa	Geo. Sweeney	9.8	48	Du	1900	4.77	9- 2-66	O	Qev	...	.....	1,100	
17abb	Test Hole 2591	357	5	Dr	1966	..	....	T	..	337	.....	1,125	L
17bcb	Frank Markovic	18	36	Dv	1900	11	....	D	Qev	...	.....	.....
20ccc	Test Hole 2444	63	5	Dr	1965	..	....	T	..	...	.....	.....
21ddd	Test Hole 2530	52	5	Dr	1966	..	....	T	..	...	.....	1,130	L
22dad	Gilmore Lee	18	30	B	1960	10	....	D	Qev	...	.....	1,117	L
23add	Erle Crain	14	4	Dv	....	8	....	D	Qev	...	.....	.....
23cbb	Marion Cagle	12.9	48	Du	1915	7.87	9- 2-66	O	Qev	...	628	1,105	C
24bbb	Walt Holweger	30	24	B	1960	6	....	D,S	Qev	...	689	.....	C
27ddd	Adrian Bailey	12	24	Dv	1962	8	....	S	Qev	...	.....	.....

28bbb	Lloyd Jarman	25	48	Du	1914	21	....	D	Qev	...	.....	.....
29bbc	L. J. Farrell	30	..	Du	1953	5	....	D	Qev	...	.....	.....
32abb	James Sweeney	10	36	Dv	....	8	....	D,S	Qev	...	.....	.....
36cdd	Joseph Holweger	16	36	Du	....	10	....	D,S	Qev	...	866	.....
<u>151-55</u>													
1bba	C. Christianson	28	48	Du	1915	..	....	S	Qev	...	.....	.....
2bbb	Albert Bornsen	30	36	Du	1963	25	....	D	Qev	...	.....	.....
2ddc	Walfrid Lilja	32	36	Du	1963	21	....	D	Qev	...	550	.....
3aba	Test Hole 2527	52	5	Dr	1966	..	....	T	..	...	.....	1,132	L
4ccc	Mrs. F. Britton	26.18	36	Du	1925	13.28	7-25-64	D,S	Qd	...	.....	.....
7ccc	Sanford Larson	50	36	B	1900	43	....	S	Qd	...	.....	.....
9cdc	W. Stromswold	28	24	B	....	8	....	D,S	Qd	...	.....	.....
11abb	Test Hole 2528	52	5	Dr	1966	..	....	T	..	...	.....	1,130	L
11ccc	Test Hole 2590	200	5	Dr	1966	..	....	T	..	190	.....	1,128	L
12ddd1	City of Larimore No. 2	58	24	Dr	1946	24.90	5-20-64	PS	Qev	...	658	1,134	C
12ddd2	Larimore Test Hole	89	3	Dr	1965	22.42	1- 5-65	T	..	...	.....	1,134	L
13aaa	Test Hole 2404	63	5	Dr	1965	11.86	9- 2-66	T,O	..	...	.....	1,127	L
13cdd	Elk Valley Farms	23	24	Dv	1948	14	....	D,S	Qev	...	646	.....
15baa	do.	12	24	Dv	1950	12	....	D,S	Qev	...	.....	.....
15dcd	Harold Warne	10	24	..	....	9	....	D,S	Qev	...	1,276	.....
18aaa	Test Hole 2589	105	5	Dr	1966	..	....	T	..	84	.....	1,151	L
19cdd	Arthur Larson	40	..	Du	1963	20	....	D	Qd	...	2,621	.....
22ccd	Clarence Meyer	18	..	Dv	....	11	....	D,S	Qev	...	.....	.....
24ccc	Test Hole 2529	53	5	Dr	1966	..	....	T	..	...	.....	1,128	L
25daa	Elk Valley Farms	16	24	Dv	....	12	....	D,S	Qev	...	.....	.....
26baa	do.	12	24	Dv	....	10	....	D	Qev	...	1,406	.....
29aaa	Rupert Fanning	60	4	Dr	1959	20	....	S	Qd	...	.....	.....
30dda	R. Walter Olson	21	30	B	....	17	....	S	Qd	...	.....	.....
31ddd	R. L. Lee	48	48	Du	....	43	....	S	Qd	...	.....	.....
32dda	Vernon Halvorson	35	36	Du	1915	30	....	D	Qd	...	.....	.....
36aaa	Test Hole 2532	53	5	Dr	1966	..	....	T	..	...	.....	1,126	L
36cbc	Elk Valley Farms	15	24	Dv	....	14	....	D,S	Qev	...	.....	.....
<u>151-56</u>													
1dad	Clifford Eastland	60	36	Du	....	20	....	S	Qd	...	.....	.....
2ada	Olson Bros.	14.0	48	Du	....	2.95	7-24-64	U	Qd	...	.....	.....

12

Location number	Owner or name	Depth of well (feet)	Diameter or size (inches)	Type	Date completed	Depth to water below land surface (feet)	Date of measurement	Use of water or well	Aquifer	Depth to bedrock (feet)	Specific conductance (micromhos at 25°C)	Altitude of land surface (feet)	Remarks
<u>151-56, Cont.</u>													
4bdd	Martin Groth	29.3	48	Du	1910	19.85	7-24-64	S	Qd	...	2,064	.....
8bcb	M. Peterson	30	18	B	1952	18	....	D,S	Kp	...	.....	.....
9ddd	Harold Larson	9.5	36	Du	....	5.00	8-30-65	U	Qd	...	.....	.....
10bab	Jerald Aaleson	16	36	Du	....	5	....	D,S	Qd	...	.....	.....
11aad	Moraine Twp.	13.8	48	Du	....	4.10	7-24-64	U	Qd	...	.....	.....
12bcb	Carl Swanson	31.5	48	Du	....	15.17	7-24-64	S	Qd	...	.....	.....
12dad	Clyde Larson	25	48	Du	....	15	....	S	Kp	...	6,706	.....
14dad	Wm. Nesdahl	17	30	Du	1959	12	....	D	Qd	...	1,184	.....
15bba	Harold Wixø	50	36	Du	1943	25	....	D,S	Qd	...	.....	.....
17dda	Alma Braaten	28	24	B	....	19	....	D,S	Qd	...	2,700	.....
18cac	Chas. Valgren	50	40	Du	....	45	....	D	Qd	...	.....	.....
21cbc	Alfred Boulden	48.7	24	B	....	25.32	9- 2-66	O	Qd	...	.....	.....
22abb	M. Rustebakke	13.7	36	B	....	4.90	7-24-64	U	Kp	...	.....	.....
26baa	O. H. Phillips Estate	18	36	Du	1954	3	....	S	Qd	...	970	.....
26cbb	Art Wells	10.1	48	Du	....	1.40	7-24-64	..	Qd	...	.....	.....
<u>152-50</u>													
7dcc	J. Mulligan Farm	280	2	Dr	1925	..	....	S	Qd	...	7,000	.....
9cda	Emil Rychart	400	3	Dr	....	Flow	8- 3-64	S	Qd	...	.....	820	
16acb1	Richard Klava	32	36	Du	1954	26	....	S	Q1a	...	.....	.....
16acb2	do.	400	3	Dr	....	8	....	S	Qd	...	.....	.....
20aaa	H. F. Root	18.1	12	B	1938	8.25	9- 6-66	O	Qd	...	1,310	828	C
29dda	Test Hole 2430	295	5	Dr	1965	8.61	9- 6-66	T,O	Q1a	283	8,360	826	L, C
33bad	Pillsbury Co.	294	8	Dr	1948	8.50	2-25-48	Ind	Qd	...	.....	830	L, C
<u>152-51</u>													
4bcc	Leonard Larson	140	2	Dr	....	Flow	8- 2-65	S,O	Kd	...	8,810	834	Flows 0.3 gpm, C.
6bcb	Isadore Fontaine	127	2	Dr	1934	Flow	8-10-65	S	Kd	...	.....	836	Flows 1.9 gpm

8abb	Emma Olson	95	2	Dr	1960	Flow	8-10-65	S	Kd	...	.....	822	Flows 3.0 gpm
8ccc	Rye Twp. School	11.0	12	Du	....	5.33	9- 1-66	O	Qd	...	386	839	C
10dcc	S. J. Bina	90	2	Dr	1963	5	....	S	Kd	...	8,815	.....
12baa	Alice Wasylow	348	2	Dr	1942	Flow	8-11-64	S	Kd	...	.....	832	
14ccc1	Dept. of Agriculture	11.7	4	Dr	1958	4.91	9- 6-66	O	Kd	...	.....	834	
14ccc2	do.	162	3	Dr	1965	Flow	1- 4-66	T	Kd	112	.....	834	Flows 7.5 gpm, L.
15ddd	do.	186	12	Dr	1966	Flow	9-15-66	T	Kd	111	.....	835	Flows 50.0 gpm, L, C.
17bbb	Sastex Oil No. 1												
	Nereson Estate	555	6	Dr	1962	..	....	T	..	...	.....	837	
19bab	Carl Clemenson	147	2	Dr	1920	Flow	8-11-64	S	Kd	...	.....	840	Flows 3.7 gpm
20adc	Fladeland Bros.	132	2	Dr	1928	Flow	8-11-64	S	Kd	...	.....	840	Flows 0.6 gpm
29bab	Sidney Clemenson	150	2	Dr	1962	Flow	8-11-64	S	Kd	...	.....	843	Flows 0.4 gpm
30baa	Ole Lommen	116	2	Dr	1936	Flow	8-11-64	S	Kd	...	6,092	844	Flows 1.7 gpm
30ddd	Geo. Saumur	122	4	Dr	1965	Flow	9-13-66	S	Kd	...	.....	823	
31ccc	J. M. Lund	160	2	Dr	....	Flow	8-11-64	S	Kd	...	.....	850	
34ccc	Bert Larivee	103	2	Dr	1946	Flow	4- 1-47	S	Kd	...	6,370	846	Flow reported 5 gpm, C.
36ddd	Test Hole 2609	257	5	Dr	1966	..	....	T	..	251	.....	836	L
<u>152-52</u>													
1bdb	O. P. Graff	70	2	Dr	1940	Flow	8- 7-64	S	Kd	...	.....	830	Flow reported 0.5 gpm.
3bcc	Randina Iverson	20	36	Du	1925	14	....	S	Q1a	...	.....	.....
5aab	Ernest Hensrud	78	2	Dr	1938	Flow	8- 7-64	D	Qd	...	9,384	833	Flows 0.5 gpm
5bbb	Henry Carlson	90	2	Dr	1963	Flow	8- 7-64	U	Qd	...	.....	835	Flows 1.0 gpm
6ccd	Bob Curtis	75	2	Dr	1910	Flow	8- 7-64	U	Qd	...	6,710	860	Flows 3.3 gpm, C
8ada	Leroy Bjerklie	14	36	Du	....	10	....	U	Q1a	...	.....	.....
8cdd	Kenneth Prey	14	36	Du	1934	..	....	S	Q1a	...	1,661	.....
9aaa	Test Hole 2411	294	5	Dr	1965	..	.....	T	Q1a	134	9,650	846	L, C
9aad	Melvin Haugen	64	3	Dr	1964	20	....	S	Qd	...	.....	.....
12bba	Test Hole 2606	63	5	Dr	1966	..	....	T	..	...	.....	845	L
15bbd	Harry Johnson	52	4	Dr	1947	17	....	S	Qd	...	.....	.....
18dba	Millard Hensrud	70	2	Dr	1952	Flow	8-10-64	S	Qd	...	5,676	863	Flows 1.4 gpm
19bab	O. N. Burtness	85	4	Dr	....	..	....	S	Qd	...	.....	.....
19dcd	Elwood Nelson	85	4	Dr	1957	Flow	8-10-64	S	Qd	...	.....	874	
20bbb	Test Hole 2599	74	5	Dr	1966	..	....	T	..	...	.....	866	L
22caa	Marl Nelson	19	19	B	1940	Flow	8-10-64	S	Qd	...	1,249	837	Flows 1.9 gpm

Location number	Owner or name	Depth of well (feet)	Diameter or size (inches)	Type	Date completed	Depth to water below land surface (feet)	Date of measurement	Use of water or well	Aquifer	Depth to bedrock (feet)	Specific conductance (micromhos at 25°C)	Altitude of land surface (feet)	Remarks
<u>152-52, Cont.</u>													
24daa	Anne Huso	185	2	Dr	....	Flow	8-10-64	S	Kd	...	.....	844	
26dcd	Test Hole 2601	126	5	Dr	1966	..	....	T	..	103	.....	855	L
28aad	Test Hole 2436	189	5	Dr	1965	..	....	T	..	136	.....	856	L
28bba	Geo. Eccles	183	2	Dr	1931	Flow	8-10-64	S	Kd	...	.....	855	Flows 4.0 gpm
32aaa	Test Hole 2600	74	5	Dr	1966	10.05	9- 3-66	T	..	...	.....	861	L
33ddd	Test Hole 2602	115	5	Dr	1966	7.80	9- 6-66	T	..	...	.....	861	L
<u>152-53</u>													
3cba	Einer Skold	70	4	Dr	1946	40	....	S	Qd	...	.....	.....
3ddcl	H. Schroeder	90	..	Dr	....	6	....	S	Qd	...	.....	.....
3ddc2	do.	18	48	Du	1900	..	....	D	Qd	...	.....	.....
6baa	Severt Kvamme	44	36x36	Du	1912	7	....	S	Qd	...	.....	.....
11bdd	L. Olson Estate	75	2	Dr	1938	5	....	D,S	Qd	...	.....	.....
19aad	Georgia Juhlke	36.6	36	B	....	7.56	9- 6-66	U	Q1a	...	.....	.....
20add	Floyd Boysom	72	4	Dr	....	25	....	S	Qd	...	.....	.....
27aaa	Test Hole 2409	105	5	Dr	1965	..	....	T	..	...	.....	905	L
30dcb	H. Vandersmith	18	36	Du	1942	14	....	D	Qd	...	.....	.....
31cba	Melford Hoime	20	36	Du	1959	17	....	S	Q1a	...	2,838	.....
36bab	U.S. Air Force	110	6	Dr	1964	..	....	T	Qd	...	.....	890	L
<u>152-54</u>													
4ccb	Glen Knutson	30	36	B	1958	15	....	D	Qd	...	.....	.....
7ccb	Gust Franson	30	30	B	1948	27	....	D	Q1a	...	.....	.....
9dcc	Arnold Pietron	435	..	Dr	1961	..	....	S	Kd	...	6,260	.....	C
10bab	Milton Kvamme	40	36	Du	1956	38	....	D	Q1a	...	492	.....	C
13cdd	C. Swanson	80	4	Dr	....	30	....	S	Qd	...	.....	.....
14ddc	Frank Bjuhlke	16	18	Du	1919	12	....	D	Q1a	...	561	.....	C
15aab	Nels Knudson	85	5	Dr	....	..	....	U	Q1a	...	.....	.....
17cab	Mrs. Hjervis Sletten	14	36	Du	1961	4	....	S	Q1a	...	.....	.....
18dcd	Bessie Johnson	50	36	Du	1949	40	....	D	Qd	...	.....	.....
23aba	Hegton School No. 42	16.2	36	Du	....	6.22	9- 6-66	O	Q1a	...	.....	.....

23bbb	Ray Bjornson	115	36	Dr	1960	40	....	D	Q1a	...	1,161	.....
24dcc	N. Plains Petroleum												
	No. 1 Danner	1,062	6	Dr	1957	..	....	T	..	...	.....	963	
27dcc	Orrin Rostberg	60	3	Dr	1954	20	....	S	Qd	...	5,480	.....	C
28dcd	Henry Johnson	12	36	B	1960	6	....	D	Qev	...	.....	.....
29ccc	Test Hole 2408	32	5	Dr	1965	5.33	9- 3-65	T,O	Qev	...	.....	1,111	L
29ddb	Elmer Peterson	15	36	Du	1938	11	....	D	Qev	...	.....	.....
30cbc	Willy Hendrickson	30	36	Du	1908	26	....	D	Qev	...	709	.....
31bbb	Test Hole 2405	84	4	Dr	1965	26.50	9- 1-65	T,O	Qev	...	696	1,127	L, C
32ddd	Thomas Smilden	40	36	Du	....	20	....	S	Qev	...	2,738	.....
33baa	Test Hole 2407	42	5	Dr	1965	..	....	T	..	...	.....	1,057	L
36acc	Test Hole 2671	100	4	Dr	1967	..	....	T	..	...	.....	942	L
36add	N. Dak. Park Service	62.7	21	B	....	13.96	9- 1-37	PS	Q1a	...	.....	.....
36dac	do.	14	16	B	1941	12	....	PS	Q1a	...	886	.....	C
<u>152-55</u>													
18dc	Tom Christianson	15	36	Du	1933	8	....	D	Qev	...	.....	.....
2cdc	Kenneth Anderson	12	36	Du	1963	5	....	D	Qev	...	.....	.....
6cbd	Maude McLaren	30	36	Du	1960	10	....	D,S	Qev	...	.....	.....
8bba	Lloyd Kyllö	25	36	Du	1925	10	....	D,S	Qev	...	.....	.....
9abb	Chester Emslie	26	36	Du	....	23	....	D	Qev	...	.....	.....
9cdd	Test Hole 2588	126	5	Dr	1966	..	....	T	..	108	.....	1,135	L
10baa	Hugh Anderson	20	36	Du	1904	17	....	D	Qev	...	410	.....
13aab	Test Hole 2440	32	5	Dr	1965	..	....	T	..	...	.....	1,113	L
13ccc	Test Hole 2524	84	5	Dr	1966	..	....	T	..	...	.....	1,134	L
14baa	Hugh Anderson	27	36	Du	....	10	....	PS	Qev	...	599	.....	C
14bbb	Test Hole 2441	84	5	Dr	1965	..	....	T	..	...	.....	1,139	L
14ccd	Test Hole 2523	63	5	Dr	1965	..	....	T	..	...	.....	1,132	L
17aaa	Andrea Gordahl	20	36	Du	....	12	....	D	Qev	...	.....	.....
18aad	Bill Griffin	15	36	Du	1962	7	....	D	Qev	...	.....	.....
19ddc	O. H. Midstokke	21	32	Du	....	14	....	D,S	Qd	...	3,000	.....
20baa	Test Hole 2442	32	5	Dr	1965	..	....	T	..	...	.....	1,141	L
22ccc	Russel Sweeney	18	36	Du	....	9	....	S	Qev	...	.....	.....
26baa	Earl Stover	28	36	Du	1959	14	....	D	Qev	...	689	.....
26ccc	Bill Eastgate	32	36	Du	1949	24	....	D	Qev	...	.....	.....
27abb	Test Hole 2525	42	5	Dr	1966	..	....	T	..	...	.....	1,131	L
27add	Test Hole 2406	63	5	Dr	1965	13.55	10- 6-65	T,O	Qev	1,125	L
28dcc	Merle Sickle	12	48x48	Du	6	D	Qev	

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152-55, Cont.													
29aab	E. M. Peterson	26	2	Dv	1937	16	U	Qev	
31bbb	Jas. Hemmingson	20	36	Du	10	D,S	Qd	
36aad	Jim May	30	..	Du	1954	20	....	D,S	Qev	...	1,440	.....
152-56													
1bbb	Haldor Skarr	14	48	Du	1948	9	....	D	Kp	...	.....	.....
2baa	Arvid Nusviken	15.5	24x24	Du	....	4.74	4-29-65	O	Kp	...	3,810	1,235	C
2bab	do.	15.7	48x48	Du	....	5.50	8- 4-64	U	Kp	...	.....	.....
6ccc	Alex Crawford	24	36	Du	1957	15	....	U	Qd	...	.....	.....
8dcd1	Earl Halstenson	20.04	36	Du	1956	13.32	8- 3-64	S	Qd	...	.....	.....
8dcd2	do.	18.94	36	Du	....	5.12	8- 3-64	U	Qd	...	.....	.....
12aab	J. S. Kyllö	650	2	Dr	1950	40	....	S	Kd	...	6,092	.....
12ccc	Leon Urness	70	36	B	....	15	....	S	Kp	...	4,200	.....
18bbb	Richard Mootz	20	60	Du	1887	15	....	D	Kd	...	646	.....
20cbb	do.	40	36	Du	1943	34	....	D,S	Kd	...	.....	.....
22dcd	Leo Verkuehlen	80	24	B	1959	45	....	D	Kd	...	.....	.....
24ddd	Allan Moen	16	36	Du	1947	7	....	D,S	Kp	...	.....	.....
25cbb	Don Hemmingson	23	36	Du	1956	11	....	D,S	Kp	...	.....	.....
30bbb	Richard Mootz	13	30	Du	....	9	....	S	Kp	...	3,600	.....
32ada	Lien Bros.	990	4	Dr	1931	250	....	S	Kd	...	4,676	.....
33aaa	do.	22.7	8	B	....	15.83	8- 4-64	U	Kp	...	.....	.....
36ccc	Oscar Solseng	18	36	Du	1963	12	....	D	Kp	...	.....	.....
153-50													
7adc	Joe Devine	195	2	Dr	1952	Flow	8-11-64	S	Kd	...	.....	818	Flow reported 3 gpm.
19aaa	Glen Callahan	110	4	Dr	....	20	....	U	Kd	...	.....	.....
20abd1	Flynn Bros.	18.5	24	B	....	12.80	8-11-64	D	Q1a	...	.....	.....
20abd2	do.	180	..	Dr	1929	Flow	8-11-64	U	Kd	...	.....	819	Flows 1.5 gpm
28baa	Dave Chisholm	38	9	B	1941	16	....	D	Q1a	...	1,584	.....

31ccc	Test Hole 2435	254	5	Dr	1965	..	....	T	..	252	.....	828	L
33dba	Archie Brown	34	18	B	1935	28	....	U	Q1a	...	.....	.....
<u>153-51</u>													
2bcc	Otto Hoverson	170	3	Dr	1940	Flow	9-21-65	S	Kd	...	1,100	815	
4add	Bernie Hoverson	150	2	Dr	....	Flow	11-11-65	S	Kd	...	.....	816	Flows 1.2 gpm
10ddc	Test Hole 2429	151	5	Dr	1965	Flow	9- 6-65	T	Kd	95	7,090	821	Flows 3.0 gpm, L, C.
21bca	Amund Amundson	180	2	Dr	1905	Flow	9-21-65	U	Kd	...	.....	828	
25aaa	Test Hole 2607	208	5	Dr	1966	..	....	T	..	203	.....	821	L
28aad	Arthur Ronan	140	2	Dr	....	Flow	9-21-65	S	Kd	...	7,100	826	Flows 1.0 gpm
29aba	Reynard Haugen	14	48x48	Du	1905	13	....	U	Q1a	...	.....	.....
34cbd	Norman Holmen	100	3	Dr	1905	Flow	9-21-65	U	Kd	...	.....	833	Flows 1.0 gpm
<u>153-52</u>													
1aaa	Ole Kvasager	120	2	Dr	1953	Flow	9-21-65	..	Kd	...	.....	829	
5cbb	Sastex No. 1												
	Wasick	820	6	Dr	1962	..	....	T	..	...	.....	840	
6dcd	Mrs. Geo. Jones	121	..	Dr	1917	..	....	U	Kd	...	.....	.....
11ccc1	D. D. Olsen	175	4	Dr	1945	..	....	U	Kd	...	.....	.....
11ccc2	do.	20	36	Du	1937	2	....	U	Q1a	...	.....	.....
14bcb	Willard Kinney	20	48x48	Du	....	..	....	U	Q1a	...	.....	.....
18ddd	Test Hole 2412	126	5	Dr	1965	Flow	8-27-65	T	..	...	7,370	846	Flows 24.0 gpm, L, C.
23bcb	Lesley Liebere	130	2	Dr	1962	Flow	9-21-65	S	Kd	...	16,500	838	
27cdd	Halfred Heen	16	48x48	Du	....	11	....	U	Q1a	...	.....	.....
27ddc	Helena Iverson	11.1	28	Du	....	5.43	8-31-66	O	Q1a	...	.....	845	
28cdb	Maline Hensrud	6.4	36	Du	....	3.30	11-8-65	U	Q1a	...	.....	.....
30ddd	Lloyd Hensrud	90	2	Dr	....	Flow	8-31-66	S,O	Qd	...	3,310	860	Flows 4.3 gpm, C
32abb	Gordon Hendrickson	100	2	Dr	....	Flow	9-21-65	S	Qd	...	3,849	852	Flows 1.5 gpm
32cbc	Test Hole 2598	116	5	Dr	1966	Flow	8-30-66	T	Qd	...	.....	865	Flows 20.0 gpm, L
36aab	Clarence Farghum	40	18	B	....	9	....	S	Qd	...	.....	.....
<u>153-53</u>													
2bcb	J. C. Stewart	126	4	Dr	....	40	....	S	Qd	...	.....	.....
4abb	C. R. Bye	58	28	B	....	14	....	S	Qd	...	.....	.....
4dda	I. E. Bonglie	36	40	Du	....	20	....	D,S	Qd	...	.....	.....
9ccc	Test Hole 2413	252	5	Dr	1965	2.08	11- 8-65	T,O	Qd	224	.....	875	L
10bbc	C. F. Cronquist	40	40	B	....	20	....	S	Qd	...	.....	.....

Location number	Owner or name	Depth of well (feet)	Diameter or size (inches)	Type	Date completed	Depth to water below land surface (feet)	Date of measurement	Use of water or well	Aquifer	Depth to bedrock (feet)	Specific conductance (micromhos at 25°C)	Altitude of land surface (feet)	Remarks
<u>153-53, Cont.</u>													
11ccd	R. O. Bjerklie	9.1	4	Du	....	5.62	8-12-65	S	Qd	...	.....	.....
13add	Curt Wilson	15	60	Du	1955	9	....	S	Qd	...	.....	.....
14ccc	Ted Paus	22	34	B	1956	8	....	S	Qd	...	.....	.....
15bbb	Milton Hunter	60	24	E	1938	20	....	U	Qd	...	.....	.....
16ccc	Theo. Brusegaard	220	2	Dr	....	Flow	....	S	Kd	...	.....	885	
17cdc	Ed Collier	24.6	36x36	Du	....	9.57	8-12-64	U	Qd	...	.....	.....
20dcd	Otto H. Moen	54	6	Dr	....	15	....	U	Qd	...	.....	.....
21ccd	John Haugen	32	28	Du	....	16	....	U	Qd	...	.....	.....
23bbb	R. E. Schjeldahl	28	24	Du	....	12	....	U	Qd	...	.....	.....
26bbb	M. G. Nelson	20	36	Du	....	10	....	S	Qd	...	.....	.....
28bbc	G. A. Rostberg	39	30	B	....	10	....	U	Qd	...	.....	.....
28ddd1	Larson Bros.	180	2	Dr	1900	..	....	U	Kd	...	.....	.....
28ddd2	do.	50	28x28	Du	1919	..	....	U	Qd	...	.....	.....
29aab	Test Hole 2597	168	5	Dr	1966	..	....	T	Qd	150	.....	890	L
29bab	A. V. Carlson	37	30	Du	....	27	....	U	Qd	...	.....	.....
30dda	do.	40	36	Du	....	20	....	U	Qd	...	.....	.....
31cbb	Omar Amundson	55	24	B	....	10	....	D	Qd	...	.....	.....
34dcd	Harold Hansen	20	36	Du	....	3	....	D	Qd	...	.....	.....
<u>153-54</u>													
3ddd	Oscar Nelson	280	4	Dr	1927	20	....	S	Qd	...	.....	.....
5bba	K. M. Montgomery	14.8	36	Du	....	8.92	9- 2-66	O	Q1a	...	.....	997	
8abb	Vernon Hancock	15	36	Du	1955	12	....	S	Q1a	...	.....	.....
8daa	Geo. Johnson	100	3	Dr	....	60	....	S	Q1a	...	.....	.....
12dcc	E. G. McLean	28	36	Du	1917	9	....	S	Qd	...	.....	.....
13baa	Everett McLean	18.7	12	Du	....	8.66	11- 8-65	S	Qd	...	.....	.....
16aaa	Robert McLean	580	2	Dr	1917	10	....	U	Kd	...	.....	.....
17ada	H. E. Ferris	640	4	Dr	1939	60	....	S	Kd	...	.....	.....
21cdd1	Lawrence Purcell	450	4	Dr	1929	..	....	U	Kd	...	.....	.....
21cdd2	do.	33	24	B	....	..	....	D	Qd	...	4,020	.....	C
23bab	E. G. McLean	320	4	Dr	1941	15	....	S	Kd	...	.....	.....

24daa	Ted Moen	60	36	B	1957	30	....	U	Qd	...	.....	.....
25dac	H. Guntzburger	55	36	Du	....	12	....	S	Qd	...	.....	.....
27abb	Walter Kleven	450	4	Dr	1961	10	....	S	Kd	...	4,938	.....
27ccd	Test Hole 2414	262	5	Dr	1965	..	....	T	..	241	.....	1,015	L
29cdd1	Raymond Trosen	25	4	Du	1963	10	....	S	Qd	...	.....	.....
29cdd2	do.	375	2	Dr	....	..	....	U	Kd	...	.....	.....
30bda	Henry Webber	12	42	Du	....	7	....	D	Q1a	...	615	.....
34aba	Oscar Nelson	10	48x48	Du	1950	7	....	D	Q1a	...	.....	.....
<u>153-52</u>													
1acc	K. M. Montgomery	8.7	36	Du	....	5.30	8-13-64	U	Q1a	...	.....	.....
2cdd	Test Hole 2420	32	5	Dr	1965	..	....	T	..	...	.....	1,103	L
2dcc	L. Moe Hammond	11.6	36	Du	....	6.18	8-11-64	O	Q1a	...	.....	1,093	
3acc	Floyd Dahl	36	36	Du	....	14	....	S	Q1a	...	.....	.....
4ccd	Test Hole 2418	62	5	Dr	1965	2.84	9- 1-65	T,O	Qev	...	770	.....	L, C
5aaa	R. C. Anderson	14	36	Du	1952	6	....	D	Qev	...	.....	.....
5ccc	Test Hole 2419	53	5	Dr	1965	3.37	9- 2-66	T,O	Qev	...	.....	.....	L
8abb	Peter Engh	20	36	Du	1918	14	....	S	Qev	...	769	.....	L
9add	Test Hole 2670	260	4	Dr	1967	..	....	T	..	249	.....	1,155	L
10ccc	Judd McMahon	16.1	36	Du	....	9.86	8-13-64	D	Qev	...	.....	.....
34													
12aba	E. T. Hein	15.4	60	Du	....	5.33	8-13-64	U	Q1a	...	.....	.....
13cdd	Glen Hulick	12	36	Du	1954	6	....	S	Q1a	...	1,280	.....
16ccc	Test Hole 2587	220	5	Dr	1966	..	....	T	..	190	.....	1,139	L
17acd	T. A. Devine	17	36	Du	1942	14	....	S	Qev	...	.....	.....
18daa	Herman Dahl	12	24	Du	1905	6	....	D	Qev	...	.....	.....
21aaa	Frank Dau	20	36	Du	1958	18	....	D,S	Qev	...	.....	.....
24bbb	Test Hole 2586	315	5	Dr	1966	..	....	T	..	298	.....	1,102	L
29baa	Harold Lien	12	12	Du	1955	9	....	D	Qev	...	.....	.....
29cbc	Elk Valley Church	18	30	B	1961	8	....	PS	Qev	...	.....	.....
30adc	Oben Gunderson	20	36	Du	1949	13	....	D	Qev	...	.....	.....
32aaa	Test Hole 2417	189	5	Dr	1965	8.83	9- 2-66	T,O	Qev	166	868	1,139	L, C
32ddd	C. A. Kyllö	21	36	Du	....	13	....	S	Qev	...	.....	.....
33acd	Murphy Test No. 1	40	4	Dr	1967	..	....	T	..	...	.....	1,137	L
33add	Murphy Test No. 2	80	4	Dr	1967	..	....	T	..	...	.....	1,136	L
33ddd	Test Hole 2522	84	5	Dr	1966	..	....	T	..	...	.....	1,140	L
34ccc1	Kyllö Obs. Well No. 1	60	4	Dr	1967	..	....	T	..	...	.....	1,139	L
34ccc2	Kyllö Obs. Well No. 2	70	4	Dr	1967	..	....	T	..	...	.....	1,138	L
34ccc3	Kyllö Obs. Well No. 3	60	4	Dr	1967	..	....	T	..	...	.....	1,137	L
34ccc4	Kyllö Obs. Well No. 4	75	4	Dr	1967	..	....	T	..	...	.....	1,140	L
34ccc5	Kyllö Production Well	62	4	Dr	1967	..	....	T	..	...	.....	1,138	L
34ccc6	Kyllö Pilot Test Hole	70	4	Dr	1967	..	....	T	..	...	.....	1,138	L

Location number	Owner or name	Depth of well (feet)	Diameter or size (inches)	Type	Date completed	Depth to water below land surface (feet)	Date of measurement	Use of water or well	Aquifer	Depth to bedrock (feet)	Specific conductance (micromhos at 25°C)	Altitude of land surface (feet)	Remarks
<u>153-55, Cont.</u>													
34ccd	Kyilo Obs. Well No. 5	60	4	Dr	1967	..	....	T	..	...	.....	1,140	L
35aba	Geo. Anderson	38	36	Du	1942	30	....	S	Q1a	...	.....	.....
35bbb	Test Hole 2416	63	5	Dr	1965	13.96	9-2-66	T,O	Qev	...	.....	1,129	L
35ccd	Wm. Murphy	30	36	Du	1962	22.82	8-13-64	S	Qd	...	1,910	.....	C
36aaa	Test Hole 2415	32	5	Dr	1965	..	....	T	..	...	.....	1,088	L
<u>153-56</u>													
1aad	Geo. Montgomery	19	48	Du	1918	15	....	D	Q1a	...	1,846	.....
2aaa	Andrew Vein	16	36	Du	1963	11	....	S	Qd	...	.....	.....
2cba	Omar Vein	20	36	Du	....	10	....	D,S	Qd	...	.....	.....
9daa	Victor Nabben	68	4	Dr	1958	15	....	S	Qd	...	2,246	.....
11baa	Herum Bros.	24	36	Du	1900	14	....	S	Qd	...	.....	.....
13bdc	D. McMahan	27	30	Du	....	10	....	S	Qd	...	2,615	.....
15ddd	Mrs. Alma Hanson	750	6	Dr	1961	200	....	S	Qd	...	.....	.....
19dcc	W. H. Krueger	40	36	Du	....	25	....	D,S	Qd	...	.....	.....
21bca	J. P. Behm	90	48	B	....	25	....	S	Kp	...	.....	.....
25aad	Arthur Jorgenson	22.0	36x36	Du	....	15.14	8-12-64	S	Qd	...	.....	.....
26add	Mrs. E. Rustebakke	60	32	Du	....	30	....	S	Qd	...	.....	.....
32dcc	Gregor Hanson	35	32	Du	1910	30	....	D,S	Kp	...	2,423	.....
34dad	Alfred Rustebakke	36.3	36	Du	1934	8.05	8-12-64	U	Qd	...	.....	.....
35baa	Effie Rustebakke	61.3	30	Du	....	14.53	8-12-64	U	Qd	...	.....	.....
<u>154-51</u>													
2dcc	Wm. A. Bayne	19.4	18	B	....	9.80	2-28-66	O	Q1a	...	.....	811	C
3dda	John Bayne	160	2	Dr	1938	20	....	S	Kd	...	.....	.....
5bab	Barney Zalindak	6.8	60	Du	....	1.50	11-10-65	U	Q1a	...	.....	.....
7cbb	Walter Leeson	158	2	Dr	....	Flow	9-10-65	S	Kd	...	.....	821	
9aab	Frank Raschke	148	2	Dr	1918	Flow	11-10-65	D,S	Kd	...	.....	813	
9bcc	Allan J. Bayne	8.1	36x36	Du	....	7.30	11-10-65	U	Q1a	...	.....	.....
11ddd	Robert Lipinski	240	2	Dr	....	Flow	11-11-65	S	Kd	...	.....	803	
14baa	Jas. Bushalski	180	2	Dr	1929	5	....	S	Kd	...	.....	.....
19ccc	Test Hole 2428	263	5	Dr	1965	Flow	9-3-65	T	Kd	117	15,100	824	L, C
25ddd	R. C. Rafter	197	3	Dr	....	Flow	11-11-65	S	Kd	...	.....	813	
36dcc	Emsch Bros.	11.1	30	B	....	4.35	9-6-66	O	Q1a	...	2,260	818	C

<u>154-52</u>													
2daa	Geo. Babinski	17	8	B	1962	6	....	S	Q1a	...	.....	.....
5daa	S. Grzadzilewski	16	36	Du	1963	12	....	S	Q1a	...	5,000	.....
7bbb	Test Hole 2585	151	5	Dr	1966	Flow	8-18-66	T	Kd	144	.....	833	L
7ccb	Barney Zolondek	170	2	Dr	1964	Flow	9-10-65	S	Kd	...	14,000	821	Flows 0.25 gpm
9ccb	Steve Briske	100	2	Dr	1935	Flow	9-10-65	S	Kd	...	.....	831	Flows 5.0 gpm
12daa	Mrs. F. Leeson	16	36	Du	1963	..	....	S	Q1a	...	.....	.....
13daa	Keith Leeson	182	2	Dr	1954	Flow	....	S	Kd	...	16,000	822	
16add	Lawrence Foley	128	2	Dr	1937	..	....	S	Kd	...	.....	.....
17bba	John Korynta	154	2	Dr	1935	..	....	S	Kd	...	.....	.....
22abb	Ernie Lunski	10	36	Du	1965	3	....	S	Q1a	...	.....	.....
31ada	do.	10.8	12	Du	....	5.26	9- 6-66	O	Q1a	...	.....	840	
32bbb	Richard Korynta	120	2	Dr	....	Flow	9-20-66	S	Kd	...	.....	839	
<u>154-53</u>													
1ddd1	C. A. Morwood	224	2	Dr	1939	Flow	5- 8-64	S	Kd	...	.....	836	
1ddd2	do.	100	2	Dr	....	2	....	D	Kd	...	.....	.....
4ccb	R. C. Clark	118	4	Dr	....	25	....	D,S	Kd	...	.....	.....
5aad	Louise Richards	31.7	36	Du	....	14.58	11- 9-65	U	Q1a	...	.....	.....
14dcc	Lee Bros.	16	24	Du	....	12	....	D	Q1a	...	.....	.....
15cdd	Pearl Burke	5.5	24	Du	....	3.40	11- 9-65	U	Q1a	...	.....	.....
17aaa	Curt Wilson	100	24	B	1920	20	....	S	Qd	...	.....	.....
18cdd	Harry Muir	20	60	Du	1929	15	....	S	Q1a	...	.....	.....
21bbb	Test Hole 2427	189	5	Dr	1965	5.79	9- 6-66	T,O	Q1a	178	.....	869	L
24bbb	V. Muir, Jr.	140	3	Dr	....	Flow	5-11-64	S	Kd	...	.....	848	
25aba	Ronald Greer	16	30	Du	....	12	....	S	Q1a	...	.....	.....
27cbc	Harry Soltine	147	2	Dr	....	Flow	4-29-64	S	Kd	...	.....	863	
32cdd	A. J. Dickson	250	4	Dr	....	Flow	4-27-64	S	Kd	...	.....	877	
33aba	A. H. Greer	205	3	Dr	1913	Flow	4-28-67	D,S	Kd	...	.....	870	
<u>154-54</u>													
1aaa	Test Hole 2584	231	5	Dr	1966	..	....	T	..	211	.....	887	L
1aad	Jay Ferguson	20	36	Du	....	15	....	D	Qd	...	.....	.....
3dda	Mack Thomas	10	36	Du	....	7	....	S	Qd	...	.....	.....	C
5cbb	Oscar Hoye	7.6	48x48	Du	....	4.52	11- 9-65	U	Qd	...	.....	.....
15bab	Lambie Bros.	21.5	24	B	....	9.47	11- 9-65	U	Qd	...	.....	.....
15ddd	Muir Bros.	20	36	Du	....	18	....	D	Qd	...	.....	.....
18cdc	Test Hole 2421	126	5	Dr	1965	3.91	6-28-66	T,O	Qd	...	1,710	1,005	L, C
21ccc	Clarence Bronsen	400	6	Dr	....	..	....	S	Kd	...	.....	.....
23bab	Herman Hulst	16	36	Du	14	D	Qd	
26bbb	Test Hole 2583	231	5	Dr	1966	T	..	219	922	L

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154-54, Cont.													
31abb	Ryan Farms	32.8	24	Du	18.40	11- 8-65	U	Qd	
32cdd	do.	43.2	28	B	9.35	11- 8-65	D,S	Q1a	
33dcc	Harold Gilhooly	13.5	30x30	Du	....	5.23	8-11-64	O	Q1a	...	.....	.....
34aaa	Sam Holweger	37	48x48	Du	....	20	....	U	Q1a	...	.....	.....
36bbb	R. K. Matteson	260	3	Dr	....	16	....	S	Qd	...	.....	.....
154-55													
1ccc	Lloyd Montgomery	35	48x48	Du	....	29	....	S	Q1a	...	.....	.....
3ccb	Forest River Colony	..	..	Sp	....	..	....	D,S	Q1a	...	589	.....
4bdc	Emmett Best	50	42	B	1913	42	....	D,S	Q1a	...	.....	.....
5ccc	Gene Thoe	17	8	B	1948	15	....	D	Qev	...	1,420	.....
8daa	Tilford Bjornstad	27	36	B	....	24	....	D	Qd	...	.....	.....
11bbb	Test Hole 2582	315	5	Dr	1966	..	....	T	..	302	.....	1,078	L
13cdc	Robert McConnachie	32	6	B	1963	10	....	PS	Q1a	...	560	.....
14bbc	Kenneth Moen	..	..	Sp	....	..	....	D,S	Q1a	...	.....	.....
14bcb	Inkster Spring	..	..	Sp	....	..	....	PS	Q1a	...	.....	.....	Flows 450 gpm
14ccc	Test Hole 2426	94	5	Dr	1965	28.06	9- 2-66	T,O	Q1a	...	617	1,115	L, C
14cdd	Groth Observation Well No. 3	63	5	Dr	1966	5.90	8-23-66	T	Q1a	...	.....	1,091	L
14dcc	Groth Observation Well No. 4	84	5	Dr	1966	6.75	8-23-66	T	Q1a	...	524	1,091	L, C
15ccc	Test Hole 2425	42	5	Dr	1965	..	....	T	Q1a	...	.....	1,129	L
15dcc	Test Hole 2518	84	5	Dr	1966	..	....	T	Q1a	...	.....	1,127	L
17ccc	Test Hole 2424	74	5	Dr	1965	10.19	9- 2-66	T,O	Q1a	...	696	1,148	L, C
18ccc	Test Hole 2422	42	5	Dr	1965	14.08	9-17-65	T,O	Q1a	...	569	1,151	L, C
20add	Norman Stokke	28	36	Du	1900	22	....	D	Q1a	...	.....	.....
23aaa	Test Hole 2517	42	5	Dr	1966	..	....	T	Q1a	...	.....	1,070	L
23abb	Muarh Water Co.	60	12	Dr	1958	..	....	PS	Q1a	...	.....	.....	C
23baal	Groth Bros.	56.8	14	B	1954	12.62	9-22-66	U	Q1a	...	.....	1,095	

23baa2	Groth Observation Well No. 1	63	5	Dr	1966	10.60	8-23-66	T	Q1a	...	.....	1,095	L
23baa3	Groth Observation Well No. 2	74	5	Dr	1966	12.06	8-23-66	T	Q1a	...	553	1,097	L, C
23baa4	Groth Observation Well No. 6	74	5	Dr	1966	9.86	8-23-66	T	Q1a	...	.....	1,095	L
23bab	Groth Observation Well No. 5	73	5	Dr	1966	6.00	8-23-66	T	Q1a	...	560	1,091	L, C
24aab	Ira Muir	8.9	36	Du	....	4.93	9- 2-66	S,O	Qd	...	.....	1,040	L
24dab	Great Northern Railway	397	4	Dr	1929	155	....	S	Qd	92	.....	.....	L
25dda	Clark Becker	18	36	B	....	..	....	D	Qd	...	.....	.....	L
26bbb	Test Hole 2519	84	5	Dr	1966	..	....	T	..	...	.....	1,115	L
27dcd	Test Hole 2520	53	5	Dr	1966	..	....	T	..	...	.....	1,125	L
29bab	Leith McManus	13	36	Du	....	12	....	D	Q1a	...	869	.....	L
29ccc	Test Hole 2521	74	5	Dr	1966	..	....	T	Qev	...	.....	1,148	L
30cdd	Melvin Hoverson	18	36	Du	1964	9	....	D	Qev	...	.....	.....	L
32bcd	Elvin Smestad	15	12	Du	1940	9	....	D	Qev	...	569	.....	L
33bcc	LaVere Anderson	18	36	B	1952	8	....	D	Qev	...	.....	.....	L
34dcc	Jack Landeis	60	36	B	1949	30	....	S	Qd	...	3,700	.....	L
<u>154-56</u>													
1ccc	Wm. Ratcliffe	48	30	B	....	40	....	D,S	Qev	...	749	.....	L
1dab	Test Hole 2580	263	5	Dr	1966	..	....	T	..	240	.....	1,161	L
2bcc	Art McConnachie	31	4	Dr	1954	8	....	D	Qev	...	680	.....	L
3cdd	Ole Flaaskog	40	36	Du	....	9.85	9- 8-65	S	Qd	...	.....	.....	L
6ddd	Eldred Hagness	40	36	Du	1960	5	....	D,S	Qd	...	.....	.....	L
7ada	Arndt Olson	28	36	B	1933	23	....	S	Qd	...	1,020	.....	L
8aba	Andrew Bondy	35	36	Du	....	10	....	U	Qd	...	1,920	.....	L
11ccc	Rexford McGavin	20.1	30	B	....	11.82	8- 3-66	O	Qd	...	.....	1,167	L
13dcc	Ronald Whaley	30	24	Du	1950	22	....	D	Qd	...	.....	.....	L
14abd	Arthur Larson	36	8	B	....	30	....	D	Qd	...	1,049	.....	L
15bba	Orian Fjestad	18	30	Du	....	16	....	D	Qd	...	.....	.....	L
15ddd	Johnson and Sundby	31.8	36	B	....	6.15	9- 2-66	O	Qd	...	.....	1,172	L
19cdd	Jas. F. Lindley	36	48	Du	....	5.72	9- 2-66	O	Kp	...	1,620	1,340	C
20ccc	Alfin Benson	28	42	Du	1907	11.95	9- 8-65	D,S	Qd	...	778	.....	L
21ada	Mary J. Muir	14.0	36	Du	....	12.53	6- 2-66	U	Qd	...	.....	.....	L
23baa	Test Hole 2423	126	5	Dr	1965	..	....	T	..	95	.....	1,157	L

Location number	Owner or name	Depth of well (feet)	Diameter or size (inches)	Type	Date completed	Depth to water below land surface (feet)	Date of measurement	Use of water or well	Aquifer	Depth to bedrock (feet)	Specific conductance (micromhos at 25°C)	Altitude of land surface (feet)	Remarks
154-56, Cont.													
24ccc	Marvin Hoverson	32	36	B	1965	22	....	D	Qd	...	549	.....
26daa	Henry Nash	20.4	24	B	....	4.25	4- 3-65	U	Qd	...	.....	.....
26dad	do.	22	36	B	1945	18	....	D	Qd	...	.....	.....
28aaa	Edwin Skjervem	30	48	Du	1912	7	....	D,S	Qd	...	.....	.....
29aab	Ross McMillan	35	36	Du	....	25	....	S	Qd	...	.....	.....
32ddd	Oscar Emerson	35	60	Du	....	..	....	D,S	Kp	...	.....	.....
34bba	Carl Emerson	29	24	Du	....	..	....	D	Qd	...	.....	.....
35ddd	Palmer Madson	26	36	Du	1960	19	....	S	Qd	...	1,561	.....

TABLE 2.--Water-level records of selected observation wells

Depth to water in feet below land surface

149-49-20bba					
Date	Water level	Date	Water level	Date	Water level
July 26, 1964.....	7.76	May 31, 1965.....	4.35	Apr. 8, 1966.....	0.38
Aug. 25.....	8.47	July 6.....	3.89	May 5.....	0.13
Oct. 5.....	7.07	Aug. 12.....	6.72	June 3.....	3.33
Oct. 28.....	7.17	Sept. 5.....	6.24	June 28.....	3.65
Dec. 3.....	7.61	Oct. 8.....	4.57	Aug. 1.....	4.27
Jan. 5, 1965.....	8.23	Nov. 1.....	4.83	Sept. 1.....	4.37
Mar. 10.....	9.05	Dec. 1.....	5.34	Sept. 30.....	6.28
Apr. 8.....	4.25	Jan. 31, 1966.....	6.78		
Apr. 30.....	3.52	Feb. 25.....	7.34		
149-51-29aba					
July 27, 1964.....	9.26	May 31, 1965.....	7.63	Apr. 8, 1966.....	7.95
Aug. 25.....	9.87	July 6.....	8.05	May 5.....	7.05
Oct. 5.....	9.36	Aug. 12.....	8.50	June 3.....	6.96
Oct. 28.....	9.21	Sept. 5.....	8.92	June 28.....	7.49
Dec. 3.....	9.34	Oct. 8.....	8.73	Sept. 1.....	8.48
Jan. 5, 1965.....	9.57	Nov. 1.....	8.42	Sept. 30.....	8.98
Mar. 10.....	9.93	Dec. 1.....	8.42	Nov. 3.....	9.33
Apr. 8.....	9.88	Jan. 31, 1966.....	8.96	Dec. 2.....	9.55
Apr. 30.....	8.76	Feb. 25.....	9.17	Jan. 4, 1967.....	9.70
149-52-5dec					
Aug. 23, 1965.....	2.61	Apr. 8, 1966.....	Frozen	Sept. 29, 1966.....	1.45
Sept. 5.....	1.66	Apr. 15.....	+0.67	Nov. 3.....	2.79
Oct. 14.....	1.20	May 5.....	+0.41	Dec. 2.....	2.46
Nov. 11.....	1.23	June 3.....	+0.39	Jan. 4, 1967.....	3.05
Dec. 1.....	1.66	June 28.....	0.68	Mar. 1.....	3.64
Dec. 30.....	1.93	Aug. 3.....	+0.30	Apr. 5.....	1.13
Jan. 31, 1966.....	Frozen	Sept. 1.....	0.19		
149-52-16bcc					
July 27, 1964.....	5.43	July 6, 1965.....	4.76	June 7, 1966.....	4.04
Aug. 25.....	6.15	Aug. 12.....	5.07	June 28.....	4.38
Oct. 5.....	4.47	Oct. 14.....	3.58	Aug. 3.....	4.39
Oct. 28.....	5.64	Nov. 4.....	3.53	Sept. 1.....	4.28
Dec. 3.....	5.29	Dec. 1.....	4.43	Sept. 30.....	4.60
Mar. 10, 1965.....	6.47	Jan. 31, 1966.....	6.03	Nov. 3.....	4.72
Apr. 8.....	6.05	Feb. 25.....	6.50	Dec. 2.....	5.20
Apr. 29.....	5.62	Apr. 8.....	5.42	Jan. 4, 1967.....	5.93
May 31.....	3.88	May 5.....	4.69		

Depth to water in feet below land surface

149-53-9ccc

Date	Water level	Date	Water level	Date	Water level
Aug. 23, 1965.....	0.44	Feb. 25, 1966.....	5.55	Sept. 29, 1966.....	3.26
Sept. 1.....	0.38	Apr. 3.....	1.94	Nov. 3.....	3.44
Oct. 14.....	0.59	May 6.....	0.62	Dec. 3.....	3.79
Nov. 4.....	1.69	June 3.....	2.57	Jan. 4, 1967.....	4.90
Dec. 1.....	2.44	June 29.....	3.07	Mar. 1.....	5.93
Dec. 30.....	3.59	Aug. 3.....	2.52	Apr. 5.....	2.04
Feb. 3, 1966.....	4.10	Sept. 1.....	1.61		

149-53-15dcc

July 27, 1964.....	10.30	Aug. 12, 1965.....	8.68	June 29, 1966.....	4.43
Aug. 25.....	11.15	Sept. 5.....	9.23	Aug. 3.....	4.26
Oct. 5.....	10.28	Oct. 14.....	8.69	Sept. 1.....	5.18
Dec. 3.....	10.20	Nov. 4.....	8.09	Sept. 29.....	6.57
Jan. 5, 1965.....	10.89	Dec. 1.....	8.06	Nov. 3.....	7.19
Feb. 5.....	10.01	Dec. 30.....	8.06	Dec. 2.....	7.40
Mar. 10.....	10.08	Feb. 3, 1966.....	8.26	Jan. 4, 1967.....	7.58
Apr. 8.....	10.02	Feb. 25.....	8.48	Mar. 1.....	8.06
Apr. 29.....	9.26	Apr. 3.....	3.81	Apr. 5.....	6.30
May 31.....	8.01	May 6.....	2.98		
July 6.....	7.98	June 3.....	3.86		

149-53-26dcc

July 5, 1964.....	4.68	Oct. 14, 1965.....	2.87	June 29, 1966.....	2.70
Aug. 25.....	5.78	Nov. 4.....	3.08	Aug. 3.....	1.70
Oct. 4.....	4.16	Dec. 1.....	3.44	Sept. 1.....	3.05
Dec. 3.....	5.08	Dec. 30.....	3.82	Sept. 29.....	3.95
Jan. 5, 1965.....	5.72	Feb. 3, 1966.....	5.45	Nov. 3.....	3.75
Mar. 10.....	5.44	Feb. 25.....	5.96	Dec. 2.....	4.48
May 30.....	1.60	Apr. 3.....	1.55	Jan. 4, 1967.....	5.10
July 6.....	3.45	May 6.....	0.23		
Aug. 12.....	3.94	June 3.....	2.21		

149-53-28ccc

Aug. 12, 1965.....	33.94	Apr. 3, 1966.....	14.75	Sept. 29, 1966.....	38.27
Sept. 5.....	33.85	May 6.....	40.78	Nov. 3.....	29.42
Nov. 4.....	37.17	June 3.....	40.35	Dec. 2.....	30.40
Dec. 1.....	47.34	June 29.....	47.47	Jan. 4, 1967.....	30.95
Dec. 30.....	42.40	Aug. 3.....	42.02	Mar. 1.....	32.08
Feb. 3, 1966.....	42.83	Sept. 1.....	39.26	Apr. 5.....	29.82
Feb. 25.....	42.35				

Depth to water in feet below land surface

149-54-4ccc					
Date	Water level	Date	Water level	Date	Water level
Sept. 5, 1965.....	4.97	Mar. 1, 1966.....	6.70	Sept. 2, 1966.....	2.18
Oct. 14.....	3.28	Apr. 3.....	3.25	Sept. 29.....	3.02
Nov. 4.....	3.40	May 6.....	3.21	Nov. 3.....	3.38
Dec. 2.....	4.02	June 3.....	2.34	Dec. 2.....	4.10
Dec. 30.....	4.54	June 27.....	1.66	Jan. 4, 1967.....	5.02
Feb. 3, 1966.....	6.12	Aug. 3.....	1.19	Mar. 1.....	6.24

149-54-9acb					
Date	Water level	Date	Water level	Date	Water level
July 27, 1964.....	51.08	Dec. 30, 1965.....	39.73	Sept. 2, 1966.....	35.81
Aug. 25.....	57.59	Feb. 3, 1966.....	38.35	Sept. 29.....	35.83
Oct. 5.....	49.32	Mar. 1.....	38.18	Nov. 3.....	34.57
Dec. 3.....	42.73	Apr. 3.....	37.65	Dec. 2.....	34.12
Sept. 5, 1965.....	47.52	May 6.....	37.47	Mar. 1, 1967.....	32.83
Oct. 14.....	41.20	June 3.....	37.25	Apr. 5.....	32.60
Nov. 4.....	40.22	June 27.....	38.20		
Dec. 2.....	39.17	Aug. 3.....	37.30		

149-55-7aba					
Date	Water level	Date	Water level	Date	Water level
Aug. 25, 1964.....	17.93	Aug. 12, 1965.....	15.75	June 27, 1966.....	12.90
Oct. 5.....	16.63	Sept. 5.....	16.85	Aug. 3.....	12.78
Oct. 28.....	16.34	Oct. 14.....	14.27	Sept. 2.....	13.20
Dec. 3.....	16.75	Nov. 4.....	14.63	Sept. 29.....	14.67
Jan. 5, 1965.....	17.50	Dec. 2.....	15.50	Nov. 3.....	15.40
Mar. 10.....	18.81	Feb. 3, 1966.....	16.67	Dec. 2.....	16.03
Apr. 9.....	19.12	Mar. 1.....	17.52	Jan. 4, 1967.....	16.65
Apr. 29.....	18.88	Apr. 8.....	17.55	Mar. 1.....	17.08
May 31.....	16.58	May 4.....	13.73	Apr. 5.....	15.98
July 6.....	15.43	June 2.....	13.25		

149-56-23adc					
Date	Water level	Date	Water level	Date	Water level
July 7, 1964.....	13.03	July 6, 1965.....	11.68	June 27, 1966.....	5.11
Aug. 25.....	14.37	Oct. 14.....	11.90	Aug. 3.....	7.60
Oct. 5.....	15.20	Nov. 4.....	12.10	Sept. 2.....	9.12
Oct. 28.....	15.40	Apr. 8, 1966.....	7.34	Sept. 29.....	10.59
Apr. 29, 1965.....	13.17	May 4.....	2.95	Nov. 3.....	11.54
May 31.....	11.63	June 2.....	3.78	Dec. 2.....	12.67

Depth to water in feet below land surface

150-50-32bbd

Date	Water level	Date	Water level	Date	Water level
July 27, 1964.....	11.30	Aug. 12, 1965.....	9.99	June 3, 1966.....	8.52
Aug. 25.....	12.09	Sept. 5.....	10.22	June 28.....	9.69
Oct. 5.....	10.47	Oct. 8.....	9.18	Aug. 3.....	8.87
Oct. 28.....	10.28	Nov. 1.....	9.24	Sept. 6.....	8.89
Dec. 3.....	10.64	Dec. 1.....	9.57	Sept. 30.....	9.64
Jan. 5, 1965.....	11.16	Dec. 30.....	9.60	Nov. 3.....	9.64
Mar. 10.....	12.06	Jan. 31, 1966.....	10.77	Dec. 1.....	10.12
Apr. 8.....	12.27	Feb. 22.....	11.32	Jan. 4, 1967.....	10.85
Apr. 30.....	10.42	Apr. 8.....	9.34		
May 31.....	9.11	May 5.....	8.12		

150-51-36aaa

Sept. 5, 1965.....	3.28	Feb. 25, 1966.....	6.23	Sept. 6, 1966.....	3.05
Oct. 8.....	1.51	Apr. 8.....	0.60	Sept. 30.....	4.02
Nov. 1.....	1.96	May. 5.....	0.24	Nov. 3.....	4.16
Dec. 1.....	3.12	June 3.....	2.54	Dec. 1.....	4.98
Dec. 30.....	3.95	June 28.....	2.58	Jan. 4, 1967.....	5.94
Jan. 31, 1966.....	5.57	Aug. 1.....	1.55	Mar. 1.....	6.86
				Apr. 5.....	2.34

150-52-16cdc

July 16, 1964.....	6.34	July 6, 1965.....	6.72	June 3, 1966.....	6.09
Aug. 25.....	6.95	Aug. 12.....	7.05	June 28.....	6.37
Oct. 5.....	6.73	Sept. 5.....	6.97	Aug. 3.....	6.82
Oct. 28.....	7.05	Oct. 8.....	6.09	Sept. 1.....	7.10
Dec. 2.....	7.38	Nov. 4.....	6.25	Sept. 30.....	7.53
Jan. 5, 1965.....	7.74	Dec. 1.....	6.57	Nov. 3.....	8.03
Feb. 5.....	8.15	Dec. 30.....	6.87	Dec. 3.....	8.34
Mar. 10.....	8.70	Jan. 31, 1966.....	7.28	Jan. 5, 1967.....	8.72
Apr. 8.....	8.13	Feb. 25.....	7.86	Mar. 1.....	8.90
Apr. 29.....	6.09	Apr. 8.....	5.61	Apr. 5.....	6.60
May 31.....	6.37	May 5.....	5.63		

150-53-7daa

July 21, 1964.....	6.74	July 6, 1965.....	6.04	May 6, 1966.....	2.76
Aug. 25.....	7.49	Aug. 12.....	7.25	June 3.....	3.99
Oct. 5.....	6.68	Sept. 1.....	7.05	July 5.....	3.56
Oct. 28.....	6.83	Oct. 8.....	5.07	Aug. 3.....	4.59
Dec. 2.....	7.09	Nov. 4.....	5.20	Sept. 1.....	5.57
Jan. 5, 1965.....	7.48	Dec. 2.....	5.47	Sept. 29.....	6.14
Mar. 10.....	8.17	Dec. 30.....	5.67	Nov. 2.....	6.37
Apr. 9.....	8.11	Feb. 3, 1966.....	6.50	Dec. 2.....	6.55
Apr. 29.....	6.12	Feb. 25.....	6.82	Jan. 4, 1967.....	7.07
May 31.....	4.66	Apr. 3.....	3.33		

Depth to water in feet below land surface

150-53-21aba

Date	Water level	Date	Water level	Date	Water level
July 28, 1964.....	5.02	June 30, 1965.....	4.56	Apr. 29, 1966.....	2.10
Aug. 25.....	5.48	July 30.....	4.93	June 3.....	3.47
Oct. 5.....	5.14	Sept. 1.....	5.60	June 27.....	4.08
Oct. 28.....	5.16	Oct. 6.....	4.72	Aug. 3.....	4.22
Dec. 2.....	5.38	Oct. 29.....	4.27	Sept. 1.....	4.67
Jan. 5, 1965.....	5.73	Dec. 1.....	4.68	Sept. 29.....	5.25
Mar. 10.....	6.54	Dec. 30.....	4.97	Nov. 4.....	5.64
Apr. 3.....	6.62	Feb. 3, 1966.....	5.57	Dec. 2.....	6.13
Apr. 26.....	5.26	Feb. 25.....	6.03	Jan. 5, 1967.....	Frozen
May 26.....	4.23	Mar. 30.....	4.32		

150-54-2ccc

July 27, 1964.....	15.11	May 31, 1965.....	14.35	Apr. 3, 1966.....	13.58
Aug. 26.....	15.60	July 6.....	14.27	May 6.....	12.52
Oct. 5.....	15.29	Aug. 12.....	14.94	June 3.....	12.30
Oct. 28.....	15.19	Sept. 1.....	15.20	June 27.....	12.35
Dec. 2.....	15.60	Oct. 8.....	14.02	Aug. 3.....	12.21
Jan. 5, 1965.....	16.11	Nov. 4.....	13.68	Sept. 2.....	12.50
Feb. 5.....	16.34	Dec. 2.....	13.93	Sept. 29.....	12.95
Mar. 10.....	16.60	Dec. 30.....	13.68	Nov. 3.....	13.18
Apr. 9.....	16.63	Feb. 3, 1966.....	15.08	Dec. 2.....	13.80
Apr. 29.....	15.30	Feb. 25.....	15.34	Jan. 5, 1967.....	14.17

150-54-4ccd

Sept. 1, 1965.....	5.48	Mar. 1, 1966.....	5.67	Sept. 2, 1966.....	3.85
Oct. 14.....	3.64	Apr. 3.....	3.50	Sept. 29.....	4.31
Nov. 4.....	3.80	May 6.....	2.48	Nov. 3.....	4.35
Dec. 2.....	4.28	June 2.....	2.83	Dec. 2.....	4.89
Dec. 30.....	4.63	June 27.....	3.02	Jan. 5, 1967.....	5.39
Feb. 3, 1966.....	5.64	Aug. 3.....	3.49		

150-54-7bbb

Sept. 1, 1965.....	7.29	Mar. 1, 1966.....	7.43	Sept. 3, 1966.....	4.92
Oct. 14.....	6.16	Apr. 3.....	5.82	Sept. 29.....	5.24
Nov. 4.....	6.26	May 6.....	5.44	Nov. 3.....	5.68
Dec. 2.....	6.19	June 2.....	5.10	Dec. 2.....	5.83
Dec. 30.....	6.31	June 28.....	4.90	Jan. 5, 1967.....	6.26
Feb. 3, 1966.....	6.94	Aug. 3.....	4.43	Mar. 1.....	6.86
				Apr. 5.....	5.03

Depth to water in feet below land surface

150-55-14baa					
Date	Water level	Date	Water level	Date	Water level
Aug. 11, 1964.....	8.22	July 6, 1965.....	7.87	June 2, 1966.....	6.47
Aug. 25.....	8.32	Aug. 12.....	8.02	June 27.....	6.44
Oct. 5.....	8.24	Sept. 1.....	8.14	Aug. 3.....	6.21
Oct. 25.....	8.24	Oct. 14.....	7.50	Sept. 2.....	6.45
Dec. 3.....	8.41	Nov. 4.....	7.40	Sept. 29.....	6.79
Jan. 5, 1965.....	8.54	Dec. 2.....	7.47	Nov. 3.....	7.00
Feb. 5.....	8.65	Dec. 30.....	7.56	Dec. 2.....	7.20
Mar. 10.....	8.80	Feb. 3, 1966.....	7.86	Jan. 5, 1967.....	7.49
Apr. 9.....	8.63	Mar. 1.....	8.12	Mar. 1.....	7.88
Apr. 29.....	8.15	Apr. 3.....	6.58	Apr. 5.....	7.07
May 31.....	7.92	May 6.....	6.57		

150-55-29daa					
July 28, 1964.....	6.25	May 31, 1965.....	5.80	June 2, 1966.....	4.62
Aug. 25.....	7.37	July 6.....	6.42	June 28.....	5.15
Oct. 5.....	5.97	Aug. 12.....	7.42	Aug. 3.....	5.43
Oct. 28.....	6.13	Sept. 5.....	8.13	Sept. 2.....	5.91
Dec. 3.....	7.70	Oct. 14.....	4.72	Sept. 29.....	6.65
Jan. 5, 1965.....	7.40	Nov. 4.....	5.05	Nov. 3.....	7.28
Feb. 5.....	7.92	Dec. 2.....	5.50	Dec. 2.....	7.61
Mar. 10.....	8.60	Mar. 1, 1966.....	6.98	Jan. 4, 1967.....	7.95
Apr. 9.....	7.68	Apr. 8.....	5.18		
Apr. 29.....	6.97	May 4.....	4.13		

150-56-15cca					
Apr. 29, 1965.....	7.02	Dec. 2, 1965.....	10.13	Aug. 3, 1966.....	7.05
May 31.....	7.00	Feb. 3, 1966.....	10.53	Sept. 2.....	7.93
July 6.....	8.15	Mar. 1.....	10.88	Sept. 29.....	9.06
Aug. 12.....	9.63	Apr. 8.....	5.60	Nov. 3.....	10.14
Sept. 5.....	10.75	May 4.....	5.29	Dec. 2.....	10.51
Oct. 14.....	10.38	June 2.....	6.27	Jan. 4, 1967.....	10.81
Nov. 4.....	10.15	June 27.....	6.82		

150-56-20cda					
July 28, 1964.....	12.36	July 6, 1965.....	10.01	June 27, 1966.....	7.77
Aug. 25.....	14.12	Aug. 12.....	10.87	Aug. 3.....	7.57
Oct. 5.....	12.72	Oct. 15.....	11.47	Sept. 2.....	8.60
Oct. 28.....	12.67	Nov. 4.....	11.34	Sept. 29.....	9.77
Dec. 3.....	12.89	Dec. 2.....	11.29	Nov. 3.....	10.31
Jan. 5, 1965.....	13.30	Feb. 3, 1966.....	12.50	Dec. 2.....	10.89
Mar. 10.....	14.09	Mar. 1.....	13.25	Jan. 4, 1967.....	11.50
Apr. 9.....	13.47	Apr. 8.....	10.00	Mar. 1.....	12.35
Apr. 29.....	10.84	May 4.....	8.20	Apr. 5.....	10.10
May 31.....	9.69	June 2.....	7.64		

Depth to water in feet below land surface

151-50-5acd

Date	Water level	Date	Water level	Date	Water level
June 30, 1966.....	10.04	Sept. 30, 1966.....	9.72	Jan. 4, 1967.....	10.54
Aug. 4.....	9.28	Nov. 4.....	10.09	Feb. 28.....	10.77
Sept. 6.....	9.38	Nov. 30.....	10.38	Apr. 5.....	11.19

151-50-30ddd

Aug. 10, 1964.....	7.46	July 6, 1965.....	4.59	June 3, 1966.....	3.47
Aug. 25.....	7.37	Aug. 12.....	5.80	June 28.....	3.98
Oct. 5.....	6.07	Sept. 5.....	6.40	Aug. 3.....	2.98
Oct. 28.....	6.42	Oct. 8.....	3.37	Sept. 6.....	5.38
Dec. 3.....	7.17	Nov. 1.....	3.24	Sept. 30.....	6.08
Jan. 5, 1965.....	8.06	Dec. 1.....	4.28	Nov. 3.....	6.59
Mar. 10.....	8.92	Jan. 31, 1966.....	6.58	Dec. 1.....	6.58
Apr. 8.....	0.00	Feb. 25.....	7.25	Jan. 4, 1967.....	7.86
Apr. 30.....	2.00	Apr. 8.....	+0.02	Mar. 1.....	8.66
May 31.....	3.74	May 5.....	1.10	Apr. 5.....	1.65

151-51-3bbb

Date	Gallons per minute	Date	Gallons per minute	Date	Gallons per minute
Aug. 12, 1965.....	2.06 gpm	Feb. 28, 1966.....	2.14	Sept. 1, 1966.....	2.14 gpm
Sept. 5.....	1.81	Apr. 3.....	2.07	Nov. 4.....	1.94
Oct. 14.....	2.14	May 5.....	2.00	Dec. 1.....	2.07
Dec. 2.....	2.22	June 2.....	2.00	Jan. 5, 1967.....	2.00
Dec. 30.....	2.61	June 28.....	2.00	Feb. 7.....	2.07
Feb. 2, 1966.....	2.00	Aug. 4.....	2.07	Mar. 1.....	2.00
				Apr. 5.....	1.87

151-52-20abb

Date	Water level	Date	Water level	Date	Water level
July 21, 1964.....	6.60	July 6, 1965.....	6.52	May 5, 1966.....	5.86
Aug. 25.....	7.12	Aug. 12.....	6.96	June 3.....	5.72
Oct. 5.....	7.38	Oct. 8.....	6.78	June 28.....	5.97
Oct. 28.....	6.66	Nov. 3.....	6.56	Aug. 3.....	5.88
Dec. 2.....	7.82	Dec. 1.....	6.75	Sept. 1.....	6.28
Jan. 5, 1965.....	8.05	Jan. 31, 1966.....	7.18	Sept. 30.....	6.73
Apr. 29.....	7.03	Feb. 25.....	7.39	Nov. 3.....	7.08
May 31.....	6.54	Apr. 8.....	6.07	Dec. 2.....	7.33
				Jan. 5, 1967.....	7.67

Depth to water in feet below land surface

151-52-34ccd

Date	Water level	Date	Water level	Date	Water level
July 28, 1964.....	13.08	July 6, 1965.....	12.10	May 5, 1966.....	7.20
Aug. 25.....	14.04	Aug. 12.....	12.76	June 3.....	8.84
Oct. 2.....	13.99	Sept. 5.....	13.35	June 28.....	10.24
Oct. 28.....	13.83	Oct. 8.....	11.38	Aug. 3.....	10.95
Dec. 2.....	14.21	Nov. 3.....	10.63	Sept. 1.....	11.94
Feb. 5, 1965.....	14.81	Dec. 1.....	11.55	Sept. 30.....	12.90
Apr. 8.....	14.95	Jan. 31, 1966.....	12.95	Nov. 3.....	13.37
Apr. 29.....	13.81	Feb. 25.....	13.40	Dec. 2.....	13.59
May 31.....	12.32	Apr. 8.....	7.75	Jan. 5, 1967.....	14.07

151-53-24ccb

July 12, 1964.....	30.68	Apr. 29, 1965.....	31.60	Feb. 2, 1966.....	29.35
Aug. 25.....	32.73	May 31.....	30.56	Feb. 25.....	29.44
Oct. 5.....	30.59	July 6.....	29.65	Apr. 8.....	29.28
Oct. 28.....	30.33	Aug. 12.....	29.67	May 5.....	28.30
Dec. 2.....	30.48	Sept. 1.....	30.09	June 3.....	27.93
Jan. 5, 1965.....	30.72	Oct. 8.....	28.97	June 27.....	27.64
Mar. 10.....	31.37	Nov. 3.....	28.64		
Apr. 9.....	31.50	Dec. 1.....	28.61		

151-53-34dcd

July 21, 1964.....	1.72	May 31, 1965.....	0.74	May 6, 1966.....	1.24
Aug. 25.....	1.27	July 6.....	2.10	June 3.....	2.12
Oct. 5.....	0.87	Aug. 12.....	2.87	June 27.....	1.90
Oct. 28.....	1.56	Sept. 1.....	2.30	Aug. 3.....	1.73
Dec. 2.....	2.54	Oct. 8.....	1.26	Sept. 1.....	2.12
Jan. 5, 1965.....	2.67	Nov. 3.....	1.71	Sept. 30.....	2.75
Mar. 10.....	2.84	Dec. 1.....	1.79	Nov. 3.....	3.08
Apr. 9.....	2.03	Feb. 2, 1966.....	Frozen	Dec. 2.....	2.78
Apr. 29.....	0.87	Apr. 8.....	0.90	Jan. 5, 1967.....	Frozen

151-54-1dca

July 15, 1965.....	4.13	Feb. 2, 1966.....	4.50	Sept. 2, 1966.....	3.59
Aug. 12.....	4.44	Feb. 25.....	4.52	Sept. 29.....	4.44
Sept. 1.....	4.40	Apr. 3.....	0.77	Nov. 3.....	4.46
Oct. 6.....	3.20	May 5.....	0.40	Dec. 1.....	4.48
Nov. 3.....	3.15	June 3.....	2.35	Jan. 5, 1967.....	4.50
Dec. 2.....	5.82	June 29.....	2.59		
Dec. 30.....	5.57	Aug. 3.....	3.04		

Depth to water in feet below land surface

151-54-16aaa

Date	Water level	Date	Water level	Date	Water level
July 27, 1964.....	6.40	May 31, 1965.....	5.62	May 6, 1966.....	3.04
Aug. 26.....	6.86	July 6.....	5.55	June 3.....	3.97
Oct. 2.....	6.96	Sept. 17.....	6.71	June 27.....	4.28
Oct. 28.....	6.76	Nov. 4.....	6.11	Aug. 3.....	4.40
Dec. 2.....	6.89	Dec. 2.....	6.07	Sept. 2.....	4.77
Jan. 5, 1965.....	7.09	Dec. 30.....	6.02	Sept. 29.....	5.50
Mar. 10.....	Frozen	Feb. 2, 1966.....	Frozen	Nov. 3.....	5.93
Apr. 9.....	Frozen	Feb. 25.....	Frozen	Dec. 2.....	6.08
Apr. 29.....	6.54	Apr. 3.....	Frozen		

151-54-23cbb

July 21, 1964.....	9.37	May 31, 1965.....	8.89	May 6, 1966.....	7.25
Aug. 26.....	9.48	July 6.....	8.80	June 3.....	7.15
Sept. 23.....	9.16	Aug. 12.....	9.03	June 27.....	7.44
Oct. 2.....	9.55	Sept. 17.....	9.18	Aug. 3.....	7.40
Oct. 28.....	9.66	Oct. 8.....	8.54	Sept. 2.....	7.87
Dec. 2.....	9.70	Nov. 4.....	8.32	Sept. 29.....	8.13
Jan. 5, 1965.....	10.45	Dec. 2.....	8.43	Nov. 3.....	8.42
Feb. 5.....	10.58	Dec. 30.....	8.67	Dec. 2.....	8.72
Mar. 10.....	10.78	Feb. 3, 1966.....	9.15		
Apr. 9.....	10.80	Feb. 25.....	9.22		
Apr. 29.....	9.42	Apr. 3.....	7.80		

151-55-13aaa

Sept. 1, 1965.....	13.39	Mar. 1, 1966.....	13.15	Sept. 2, 1966.....	11.86
Oct. 8.....	13.19	Apr. 3.....	12.73	Sept. 29.....	11.74
Nov. 4.....	13.16	May 4.....	12.67	Nov. 3.....	11.66
Dec. 2.....	13.19	June 2.....	12.33	Dec. 2.....	11.68
Dec. 30.....	13.06	June 27.....	12.39	Jan. 5, 1967.....	11.68
Feb. 3, 1966.....	13.12	Aug. 3.....	12.12	Mar. 1.....	11.73
				Apr. 5.....	11.71

151-56-21cbc

July 24, 1964.....	32.80	July 6, 1965.....	30.98	May 4, 1966.....	27.75
Aug. 25.....	32.90	Aug. 12.....	30.88	June 2.....	25.36
Oct. 5.....	31.72	Aug. 30.....	31.22	June 27.....	24.93
Oct. 28.....	32.15	Oct. 14.....	29.68	Aug. 3.....	24.42
Dec. 3.....	32.17	Nov. 4.....	29.48	Sept. 2.....	25.32
Jan. 5, 1965.....	32.73	Dec. 2.....	29.13	Sept. 29.....	26.34
Mar. 10.....	34.07	Feb. 3, 1966.....	30.55	Nov. 3.....	27.18
Apr. 29.....	33.86	Mar. 1.....	31.43		
May 31.....	32.16	Apr. 8.....	30.00		

Depth to water in feet below land surface

152-50-20aaa

Date	Water level	Date	Water level	Date	Water level
Aug. 17, 1964.....	6.77	June 30, 1965.....	5.22	June 3, 1966.....	4.25
Aug. 26.....	10.10	July 30.....	6.18	June 29.....	6.16
Oct. 2.....	7.00	Sept. 1.....	8.20	Aug. 4.....	6.28
Oct. 29.....	8.42	Oct. 6.....	6.17	Sept. 6.....	8.25
Dec. 3.....	8.77	Oct. 29.....	6.09	Sept. 28.....	8.90
Jan. 6, 1965.....	9.22	Nov. 30.....	6.96	Oct. 30.....	8.70
Feb. 5.....	9.52	Dec. 30.....	7.02	Nov. 30.....	9.00
Mar. 11.....	9.94	Jan. 31, 1966.....	7.95	Jan. 4, 1967.....	9.32
Apr. 2.....	8.80	Feb. 28.....	8.53	Feb. 7.....	9.57
Apr. 26.....	3.21	Mar. 30.....	3.19	Feb. 28.....	9.70
May 26.....	4.09	May 4.....	2.50	Apr. 5.....	Frozen

152-50-29dda

Sept. 10, 1965.....	19.61	Feb. 28, 1966.....	26.90	Sept. 6, 1966.....	8.61
Oct. 6.....	17.50	Mar. 30.....	26.66	Sept. 28.....	11.74
Nov. 1.....	21.92	Mar. 5.....	26.19	Nov. 7.....	18.71
Nov. 30.....	24.32	June 3.....	21.36	Dec. 1.....	21.64
Dec. 29.....	24.89	June 29.....	16.00	Jan. 4, 1967.....	21.18
Jan. 31, 1966.....	27.79	Aug. 4.....	12.15	Feb. 28.....	22.36
				Apr. 5.....	20.77

152-51-4bcc

Date	Gallons per minute	Date	Gallons per minute	Date	Gallons per minute
Aug. 2, 1965.....	0.45	Jan. 31, 1966.....	0.39	Aug. 4, 1966.....	0.33
Sept. 7.....	0.44	Feb. 28.....	0.38	Sept. 1.....	0.32
Oct. 6.....	0.44	Apr. 1.....	0.38	Sept. 30.....	0.30
Nov. 1.....	0.43	May 5.....	0.36	Nov. 4.....	0.29
Dec. 1.....	0.41	June 2.....	0.34	Dec. 1.....	0.27
Jan. 4, 1966.....	0.40	June 28.....	0.34	Jan. 5, 1967.....	0.25

152-51-8ccc

Date	Water level	Date	Water level	Date	Water level
Aug. 14, 1964.....	6.62	Aug. 2, 1965.....	5.27	June 2, 1966.....	3.43
Aug. 26.....	7.07	Sept. 7.....	5.66	June 29.....	4.33
Oct. 2.....	5.81	Oct. 6.....	3.05	Aug. 4.....	4.16
Oct. 29.....	6.18	Nov. 1.....	3.35	Sept. 1.....	5.33
Dec. 2.....	6.70	Dec. 1.....	3.99	Sept. 30.....	6.75
Mar. 11, 1965.....	8.29	Jan. 4, 1966.....	5.08	Nov. 4.....	7.52
Apr. 12.....	6.27	Jan. 31.....	6.58	Dec. 1.....	7.82
Apr. 28.....	5.20	Feb. 28.....	7.48	Jan. 5, 1967.....	8.30
May 31.....	3.21	Apr. 1.....	+0.80	Feb. 28.....	8.85
July 6.....	4.33	May 5.....	1.33	Apr. 5.....	3.94

Depth to water in feet below land surface

152-51-14ccc1

Date	Water level	Date	Water level	Date	Water level
Nov. 2, 1965.....	0.81	May 5, 1966.....	0.57	Nov. 7, 1966.....	6.16
Dec. 1.....	1.45	June 2.....	2.89	Dec. 1.....	6.32
Jan. 4, 1966.....	1.72	June 29.....	4.61	Jan. 4, 1967.....	7.52
Feb. 2.....	3.47	Aug. 4.....	2.35	Feb. 28.....	7.83
Feb. 28.....	5.10	Sept. 6.....	4.91	Apr. 5.....	8.23
Mar. 1.....	0.13	Sept. 30.....	6.23		

152-52-9aaa

Oct. 7, 1965.....	+0.01	Feb. 28, 1966.....	5.73	Aug. 4, 1966.....	2.14
Oct. 29.....	0.59	Mar. 30.....	1.78	Aug. 31.....	2.91
Dec. 1.....	1.91	May 4.....	Frozen	Sept. 30.....	3.31
Dec. 30.....	2.68	June 2.....	1.13		
Jan. 31, 1966.....	4.97	June 29.....	1.75		

152-54-23aba

Aug. 12, 1964.....	7.14	June 30, 1965.....	5.28	June 2, 1966.....	4.97
Aug. 26.....	6.94	July 30.....	5.60	June 29.....	5.41
Oct. 2.....	6.18	Sept. 1.....	6.17	Aug. 4.....	5.45
Oct. 29.....	6.48	Oct. 6.....	4.73	Sept. 6.....	5.79
Dec. 3.....	6.73	Oct. 28.....	4.90	Sept. 30.....	6.22
Jan. 5, 1965.....	6.97	Nov. 30.....	5.49	Nov. 4.....	6.45
Feb. 5.....	7.17	Dec. 30.....	5.78	Dec. 1.....	6.59
Mar. 11.....	7.26	Feb. 2, 1966.....	6.47	Jan. 5, 1967.....	6.79
Apr. 3.....	6.94	Feb. 28.....	6.79	Mar. 1.....	7.07
Apr. 26.....	4.76	Mar. 30.....	5.18	Apr. 5.....	5.31
May 26.....	4.61	Apr. 29.....	4.47		

152-54-29ecc

Sept. 3, 1965.....	5.33	Feb. 2, 1966.....	Frost	Sept. 6, 1966.....	4.16
Sept. 17.....	5.11	Apr. 3.....	5.70	Sept. 29.....	4.54
Oct. 6.....	4.00	May 4.....	4.19	Nov. 4.....	5.36
Nov. 3.....	4.04	June 2.....	4.12	Dec. 1.....	5.73
Nov. 30.....	4.50	June 29.....	3.86	Jan. 7, 1967.....	6.36
Dec. 30.....	5.76	Aug. 3.....	3.76		

Depth to water in feet below land surface

152-54-31bbb

Date	Water level	Date	Water level	Date	Water level
Sept. 1, 1965.....	26.50	Feb. 28, 1966.....	26.20	Sept. 9, 1966.....	25.31
Sept. 17.....	26.46	Mar. 30.....	25.96	Nov. 4.....	25.34
Oct. 6.....	26.42	Apr. 29.....	25.74	Dec. 1.....	25.33
Oct. 29.....	26.33	May 31.....	25.65	Jan. 5, 1967.....	25.39
Nov. 30.....	26.29	June 29.....	25.57	Feb. 7.....	25.50
Dec. 30.....	26.20	Aug. 3.....	25.43	Mar. 1.....	25.49
Feb. 2, 1966.....	26.16	Sept. 6.....	25.33	Apr. 5.....	25.37

152-55-27ddd

Oct. 6, 1965.....	13.55	Apr. 3, 1966.....	12.71	Sept. 29, 1966.....	13.37
Nov. 3.....	13.54	May 4.....	12.75	Nov. 4.....	13.27
Nov. 30.....	13.55	June 2.....	12.40	Dec. 1.....	13.51
Dec. 30.....	13.59	June 29.....	12.97	Jan. 5, 1967.....	13.75
Feb. 2, 1966.....	13.68	Aug. 3.....	12.93		
Feb. 28.....	13.82	Sept. 6.....	13.17		

152-56-2baa

Apr. 29, 1965.....	6.74	Nov. 30, 1965.....	3.66	June 27, 1966.....	2.25
June 1.....	4.99	Jan. 4, 1966.....	4.57	Sept. 3.....	1.35
July 6.....	2.98	Feb. 2.....	6.12	Sept. 29.....	2.43
Aug. 6.....	4.88	Mar. 1.....	6.95	Nov. 4.....	3.10
Aug. 30.....	6.73	Apr. 3.....	4.57	Dec. 1.....	4.00
Oct. 7.....	4.34	May 4.....	1.90	Jan. 4, 1967.....	5.36
Nov. 3.....	3.53	June 2.....	2.42	Mar. 1.....	7.34
				Apr. 5.....	4.29

153-52-27ddc

Aug. 17, 1964.....	5.74	July 7, 1965.....	3.33	May 4, 1966.....	0.68
Aug. 26.....	5.88	Aug. 2.....	4.13	June 2.....	1.83
Oct. 2.....	5.87	Aug. 27.....	5.39	June 29.....	3.21
Oct. 29.....	5.51	Oct. 7.....	3.43	Aug. 4.....	4.44
Dec. 2.....	5.61	Nov. 1.....	3.04	Aug. 31.....	5.43
Jan. 6, 1965.....	6.03	Dec. 1.....	3.39	Sept. 30.....	7.17
Feb. 5.....	6.42	Dec. 30.....	3.65	Nov. 4.....	7.00
Mar. 11.....	6.66	Jan. 31, 1966.....	4.63	Dec. 1.....	6.01
Apr. 28.....	1.44	Feb. 28.....	5.15	Jan. 5, 1967.....	7.17
June 1.....	1.45	Apr. 1.....	+0.37		

Depth to water in feet below land surface

153-52-30odd

Date	Gallons per minute	Date	Gallons per minute	Date	Gallons per minute
Oct. 29, 1964.....	2.85	Aug. 27, 1965.....	3.00	June 2, 1966.....	3.75
Dec. 2.....	2.50	Oct. 7.....	2.98	June 29.....	3.00
Jan. 6, 1965.....	2.72	Nov. 1.....	2.85	Aug. 4.....	3.53
Feb. 5.....	2.65	Dec. 1.....	3.00	Aug. 31.....	4.28
Mar. 11.....	2.08	Dec. 30.....	2.85	Sept. 30.....	4.25
Apr. 28.....	2.80	Jan. 31, 1966.....	2.72	Nov. 4.....	3.53
June 1.....	2.86	Feb. 28.....	2.66	Dec. 1.....	3.33
July 6.....	2.54	Apr. 1.....	2.40	Jan. 5, 1967.....	3.60
Aug. 2.....	3.00	May 4.....	4.00	Mar. 1.....	2.40

153-53-9ccc

Date	Water level	Date	Water level	Date	Water level
Nov. 8, 1965.....	2.08	Apr. 1, 1966.....	2.50	Sept. 6, 1966.....	3.37
Nov. 30.....	1.50	May 5.....	1.14	Sept. 28.....	4.30
Dec. 29.....	3.68	June 2.....	2.43	Nov. 4.....	4.45
Feb. 2, 1966.....	6.08	June 27.....	1.94	Dec. 1.....	5.35
Feb. 28.....	Frozen	Aug. 4.....	2.60	Jan. 7, 1967.....	5.78

153-54-5bba

Dec. 2, 1964.....	9.99	Sept. 1, 1965.....	9.88	June 2, 1966.....	6.43
Jan. 6, 1965.....	10.74	Oct. 7.....	8.64	June 27.....	6.79
Feb. 5.....	11.32	Nov. 2.....	8.39	Aug. 4.....	8.37
Mar. 11.....	11.63	Nov. 30.....	8.86	Sept. 2.....	8.92
Apr. 12.....	11.27	Dec. 29.....	9.27	Sept. 28.....	9.73
Apr. 29.....	8.19	Feb. 2, 1966.....	10.34	Nov. 4.....	10.18
June 1.....	7.33	Feb. 28.....	10.82	Dec. 1.....	10.54
July 6.....	8.29	Apr. 3.....	8.79	Jan. 4, 1967.....	11.06
Aug. 2.....	8.86	May 4.....	6.51	Mar. 1.....	11.60
				Apr. 5.....	8.44

153-55-2dec

Aug. 11, 1964.....	6.18	June 1, 1965.....	4.12	Apr. 2, 1966.....	2.34
Aug. 25.....	6.10	July 6.....	4.96	Apr. 29.....	2.44
Oct. 5.....	5.73	Aug. 2.....	5.41	June 2.....	3.67
Oct. 28.....	5.90	Sept. 1.....	6.12	June 27.....	4.06
Dec. 2.....	6.04	Oct. 7.....	4.00	Aug. 3.....	4.80
Jan. 6, 1965.....	6.32	Nov. 2.....	4.00	Sept. 2.....	4.35
Feb. 5.....	6.61	Nov. 30.....	4.18	Sept. 29.....	5.48
Mar. 11.....	6.85	Dec. 29.....	4.39	Nov. 4.....	5.46
Apr. 12.....	6.61	Feb. 2, 1966.....	5.45	Dec. 1.....	5.57
Apr. 29.....	6.00	Mar. 1.....	5.82	Jan. 5.....	Frozen

Depth to water in feet below land surface

153-55-4ccd					
Date	Water level	Date	Water level	Date	Water level
Sept. 1, 1965.....	2.84	Apr. 3, 1966.....	1.28	Sept. 29, 1966.....	2.35
Sept. 17.....	1.63	Apr. 29.....	0.62	Nov. 4.....	2.59
Oct. 7.....	1.49	June 2.....	0.99	Dec. 1.....	2.95
Nov. 2.....	1.76	June 27.....	1.16	Jan. 4, 1967.....	2.92
Nov. 30.....	1.14	Aug. 3.....	1.85		
Dec. 29.....	2.45	Sept. 2.....	1.77		

153-55-5ccc					
Sept. 1, 1965.....	4.60	Mar. 1, 1966.....	5.17	Sept. 29, 1966.....	3.80
Sept. 17.....	4.14	Apr. 3.....	4.77	Nov. 4.....	4.18
Oct. 7.....	3.29	Apr. 29.....	3.92	Dec. 1.....	4.34
Nov. 2.....	2.99	June 2.....	2.38	Jan. 4, 1967.....	4.85
Nov. 30.....	3.24	June 27.....	2.52	Mar. 1.....	5.44
Dec. 29.....	3.74	Aug. 3.....	3.20	Apr. 5.....	5.22
Feb. 2, 1966.....	4.65	Sept. 2.....	3.37		

153-55-32aaa					
Sept. 1, 1965.....	10.01	Mar. 1, 1966.....	10.93	Sept. 2, 1966.....	8.83
Oct. 7.....	10.52	Apr. 3.....	9.76	Sept. 29.....	9.05
Nov. 3.....	10.34	May 4.....	8.82	Nov. 4.....	9.55
Nov. 30.....	10.32	June 2.....	8.60	Dec. 1.....	9.70
Dec. 30.....	10.44	June 27.....	8.62	Jan. 4, 1967.....	9.83
Feb. 2, 1966.....	10.63	Aug. 3.....	7.60	Mar. 1.....	10.35

153-55-35bbb					
Sept. 1, 1965.....	16.05	Mar. 1, 1966.....	14.93	Sept. 2, 1966.....	13.96
Oct. 7.....	15.52	Apr. 3.....	14.16	Sept. 29.....	14.10
Nov. 3.....	14.66	May 4.....	14.00	Nov. 4.....	14.51
Nov. 30.....	13.90	June 2.....	13.82	Dec. 1.....	14.56
Dec. 30.....	14.68	June 27.....	13.85	Jan. 4, 1967.....	14.71
Feb. 2, 1966.....	14.69	Aug. 3.....	14.00		

154-51-2dcc					
Aug. 13, 1964.....	10.49	Apr. 9, 1965.....	10.70	Dec. 29, 1965.....	9.04
Aug. 26.....	11.04	July 7.....	6.48	Feb. 2, 1966.....	9.70
Oct. 2.....	12.31	Aug. 2.....	6.64	Feb. 28.....	9.80
Oct. 29.....	12.54	Sept. 3.....	9.75	May 5.....	0.77
Dec. 3.....	12.82	Oct. 6.....	6.28		
Jan. 6, 1965.....	12.88	Nov. 1.....	7.55		
Mar. 11.....	12.80	Nov. 30.....	8.46		

Depth to water in feet below land surface

154-51-36dce

Date	Water level	Date	Water level	Date	Water level
Aug. 13, 1964.....	7.00	July 7, 1965.....	3.92	May 5, 1966.....	0.30
Aug. 26.....	7.61	Aug. 2.....	4.64	June 7.....	1.28
Oct. 2.....	8.43	Sept. 3.....	7.02	June 29.....	3.14
Oct. 29.....	8.55	Oct. 6.....	4.64	Aug. 4.....	2.97
Dec. 3.....	8.60	Nov. 1.....	4.28	Sept. 6.....	4.35
Jan. 6, 1965.....	8.68	Nov. 30.....	4.53	Sept. 26.....	5.59
Mar. 11.....	9.78	Dec. 29.....	4.62	Nov. 7.....	8.06
Apr. 28.....	2.24	Feb. 28, 1966.....	5.70	Dec. 1.....	6.44

154-52-31ada

Nov. 9, 1965.....	3.67	May 5, 1966.....	0.67	Nov. 4, 1966.....	7.54
Nov. 30.....	4.29	June 2.....	3.53	Dec. 1.....	7.75
Dec. 29.....	4.10	June 29.....	3.13	Jan. 5, 1967.....	8.13
Feb. 2, 1966.....	6.65	Aug. 4.....	5.05	Feb. 28.....	9.26
Feb. 28.....	7.90	Sept. 6.....	5.26	Apr. 5.....	4.80
Apr. 1.....	2.27	Sept. 28.....	7.10		

154-53-21bbb

Nov. 2, 1965.....	3.96	June 27, 1966.....	3.29	Nov. 4, 1966.....	7.38
Apr. 1, 1966.....	4.29	Aug. 4.....	5.00	Dec. 1.....	7.86
May 4.....	1.80	Sept. 6.....	5.79	Jan. 5, 1967.....	8.60
June 2.....	3.58	Sept. 28.....	6.58	Apr. 5.....	8.73

154-54-18edc

Sept. 3, 1965.....	9.84	Nov. 30, 1965.....	5.54	Apr. 1, 1966.....	5.24
Sept. 17.....	7.23	Dec. 29.....	5.39	May 4.....	3.10
Oct. 7.....	6.60	Feb. 2, 1966.....	5.65	June 2.....	3.32
Nov. 2.....	6.15	Mar. 1.....	5.80	June 28.....	3.91

154-54-33dce

Aug. 11, 1964.....	5.23	June 1, 1965.....	3.55	June 2, 1966.....	1.80
Aug. 25.....	4.85	Aug. 2.....	5.10	June 27.....	1.80
Oct. 5.....	4.37	Nov. 2.....	3.20	Aug. 4.....	2.65
Oct. 28.....	4.98	Nov. 30.....	Frozen		
Apr. 29, 1965.....	5.80	Apr. 3, 1966.....	2.55		

Depth to water in feet below land surface

154-55-14ccc					
Date	Water level	Date	Water level	Date	Water level
Sept. 17, 1965.....	29.33	Mar. 1, 1966.....	29.22	Sept. 2, 1966.....	28.06
Oct. 7.....	29.48	Apr. 1.....	28.59	Sept. 28.....	29.39
Nov. 2.....	29.43	May 4.....	28.30	Nov. 4.....	27.70
Nov. 30.....	29.32	June 2.....	28.22	Dec. 1.....	28.04
Dec. 29.....	29.19	June 27.....	28.17	Jan. 4, 1967.....	28.04
Feb. 2, 1966.....	29.22	Aug. 3.....	28.05	Mar. 1.....	28.64
				Apr. 5.....	27.02

154-55-17ccc					
Date	Water level	Date	Water level	Date	Water level
Sept. 3, 1965.....	11.68	Apr. 3, 1966.....	10.73	Nov. 4, 1966.....	10.25
Sept. 17.....	11.65	Apr. 29.....	10.88	Dec. 1.....	10.27
Oct. 7.....	11.56	June 2.....	10.56	Jan. 4, 1967.....	10.39
Oct. 29.....	11.66	June 27.....	10.39	Feb. 7.....	10.46
Nov. 30.....	11.54	Aug. 3.....	10.19	Mar. 1.....	10.44
Dec. 29.....	11.50	Sept. 2.....	10.19	Apr. 5.....	10.38
Feb. 2, 1966.....	11.52	Sept. 28.....	10.12		

154-55-18ccc					
Date	Water level	Date	Water level	Date	Water level
Sept. 17, 1965.....	15.88	Mar. 1, 1966.....	16.09	Sept. 2, 1966.....	14.52
Oct. 7.....	16.23	Apr. 1.....	15.90	Sept. 28.....	14.40
Oct. 29.....	16.18	May 4.....	15.68	Nov. 4.....	14.24
Nov. 30.....	15.97	June 2.....	15.40	Dec. 1.....	14.60
Dec. 29.....	15.86	June 27.....	15.03	Jan. 4, 1967.....	14.69
Feb. 2, 1966.....	15.59	Aug. 3.....	14.70		

154-55-24aab					
Date	Water level	Date	Water level	Date	Water level
Aug. 12, 1964.....	6.05	June 1, 1965.....	3.29	Apr. 1, 1966.....	3.00
Aug. 25.....	5.88	July 6.....	4.60	May 4.....	2.10
Oct. 5.....	5.4	Aug. 6.....	4.94	June 2.....	3.41
Oct. 28.....	5.44	Sept. 1.....	6.34	June 27.....	3.58
Dec. 2.....	6.05	Oct. 7.....	3.60	Aug. 3.....	5.16
Jan. 6, 1965.....	6.70	Nov. 2.....	3.77	Sept. 2.....	4.93
Feb. 5.....	7.20	Nov. 30.....	4.05	Sept. 28.....	6.30
Mar. 11.....	7.22	Dec. 29.....	6.49	Nov. 4.....	5.95
Apr. 12.....	5.84	Feb. 2, 1966.....	6.56	Dec. 11.....	6.20
Apr. 29.....	4.43	Mar. 1.....	7.05	Jan. 5, 1967.....	Frozen

Depth to water in feet below land surface

Date	Water level	Date	Water level	Date	Water level
154-56-11ccc					
Aug. 11, 1964.....	12.58	July 6, 1965.....	13.06	May 4, 1966.....	11.86
Aug. 25.....	12.60	Aug. 6.....	13.00	June 2.....	11.59
Oct. 5.....	12.82	Sept. 1.....	12.88	June 27.....	11.59
Oct. 28.....	12.82	Oct. 7.....	11.97	Aug. 3.....	11.82
Dec. 2.....	12.95	Nov. 2.....	11.13	Sept. 28.....	12.14
Jan. 6, 1965.....	13.08	Nov. 30.....	11.05	Nov. 4.....	12.42
Mar. 10.....	13.30	Dec. 29.....	11.27	Dec. 1.....	12.56
Apr. 12.....	13.36	Feb. 2, 1966.....	11.58	Jan. 4, 1967.....	12.74
Apr. 29.....	13.01	Mar. 1.....	11.84		
June 1.....	13.07	Apr. 1.....	11.65		
154-56-15ddd					
Dec. 2, 1964.....	6.59	Sept. 1, 1965.....	4.63	June 2, 1966.....	4.12
Jan. 6, 1965.....	7.22	Oct. 7.....	1.27	June 27.....	4.15
Feb. 5.....	8.22	Nov. 2.....	2.93	Aug. 3.....	5.19
Mar. 10.....	9.24	Nov. 30.....	4.14	Sept. 2.....	6.15
Apr. 12.....	9.23	Dec. 29.....	5.02	Sept. 28.....	6.54
Apr. 29.....	8.24	Feb. 2, 1966.....	7.24	Nov. 4.....	6.77
June 1.....	5.09	Mar. 1.....	8.22	Dec. 1.....	6.98
July 6.....	4.55	Apr. 1.....	7.20	Jan. 4, 1967.....	7.67
Aug. 6.....	4.24	May 4.....	4.43	Mar. 1.....	8.75
				Apr. 5.....	6.52
154-56-19cdd					
Aug. 11, 1964.....	6.80	July 6, 1965.....	5.47	June 2, 1966.....	2.81
Aug. 25.....	7.33	Aug. 6.....	6.67	June 27.....	3.12
Oct. 5.....	7.79	Sept. 1.....	7.75	Aug. 3.....	4.06
Oct. 28.....	8.04	Oct. 7.....	5.22	Sept. 2.....	5.72
Apr. 29.....	8.30	Nov. 2.....	4.78	Sept. 28.....	6.81
June 1.....	4.26	May 4, 1966.....	0.92	Nov. 4.....	7.63

TABLE 3.--Logs of test holes and selected wells

149-49-7add

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Soil, brownish-black, clayey-----	1	1
	Silt, brownish-gray, clayey, oxidized-----	6	7
	Clay, brownish-gray, silty, oxidized-----	8	15
	Clay, medium-gray to olive-gray, silty, slightly calcareous-----	10	25
	Clay, olive-gray, silty, noncalcareous; lam- inated silt-----	50	75
	Till, olive-gray, very clayey-----	53	128
	Clay, olive-gray, slightly silty, very plastic-	29	157
	Till, olive-gray to medium-dark-gray, sandy, cohesive-----	18	175
	Gravel, fine to medium, subangular to sub- rounded, sandy to bouldery; olive-gray sandy till from 195 to 197-----	30	205
	Till, olive-gray to medium-dark-gray, sandy; interstratified gravel deposits-----	23	228
	Gravel, coarse, subangular to subrounded; minor amounts of sand-----	17	245
	Till, light-olive-gray, sandy, oxidized(?)-----	5	250
	Till, brownish-gray, sandy-----	10	260
	Sand, medium to coarse, poorly sorted, sub- angular quartzose; interstratified gravel---	5	265
	Till, light-olive-gray to olive-gray, sandy---	3	268
Precambrian:	Schist, greenish-gray to dark-greenish-gray, clayey, containing white feldspar and dark- green amphibole crystals-----	2	270

149-49-32aaa

Glacial drift:	Soil, dusky-brown-----	1	1
	Silt, yellowish-gray, clayey, oxidized-----	16	17
	Clay, light-olive-gray, unoxidized-----	42	59
	Till, olive-gray, silty-----	100	159
	Till, olive-gray; contains sand and gravel----	13	172
	Sand, fine to medium, clayey; contains coarse sand and fine gravel-----	5	177
	Till, olive-black, silty; contains small amount of gravel-----	68	242
Dakota Group:	Clay, pale-pink, silty, noncalcareous; scattered quartz grains-----	31	273

149-50-7cdc

Glacial drift:	Soil, black, silty-----	2	2
	Silt, dark-yellowish-gray to light-brown, oxidized-----	5	7
	Till, mottled dark-yellowish-orange to light- brown, oxidized-----	14	21
	Till, olive-gray, clayey, plastic-----	59	80
	Clay, olive-gray, very plastic, moderately calcareous-----	7	87

149-50-7cdc--Continued

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:--Continued			
	Sand, fine to medium, poorly sorted, subrounded quartzose-----	4	91
	Till; poor samples-----	32	123
	Sand, very fine to medium, poorly sorted, subangular to subrounded, quartzose; interstratified gravel near base-----	17	140
	Gravel, fine to very coarse, poorly sorted, bouldery-----	14	154
	Till, olive-gray; poor samples-----	17	171
	Sand, fine to coarse, poorly sorted, subangular to subrounded, quartzose-----	4	175
	Till, olive-gray, silty to sandy, cohesive, very calcareous-----	18	193
	Silt, olive-gray, cohesive, noncalcareous-----	2	195
	Sand; poor samples-----	4	199
	Silt, olive-gray, clayey, cohesive-----	9	208
	Till, olive-gray, silty to sandy, cohesive-----	34	242
	Till, olive-gray, clayey to silty, cohesive-----	20	262
	Clay, olive-gray, silty; speckled brownish-gray-----	35	297
	Till, dark-yellowish-brown to brownish-gray, sandy, very calcareous; driller reports interstratified gravel-----	13	310
Winnipeg Group:	Clay, mottled or interbedded grayish-orange-pink to light-brown and light-greenish-gray, cohesive, very calcareous; interstratified limestone, poor recovery-----	5	315

149-50-11ccc

Glacial drift:			
	Soil, dusky-brown, silty-----	1	1
	Silt, yellowish-gray, clayey, oxidized-----	15	16
	Clay, light-olive-gray, unoxidized-----	37	53
	Till, olive-gray, silty-----	85	138
	Till, olive-gray, sandy-----	7	145
	Till, light-olive-gray, sandy, very calcareous; contains coarse sand and fine gravel-----	34	179
	Clay, olive-gray, silty, very calcareous-----	26	205
	Sand, fine to medium, gravelly-----	2	207
	Till, olive-gray, silty; contains some sand and gravel-----	67	274
	Till, light-olive-gray, silty; contains sand and gravel-----	41	315
Precambrian:	Chlorite schist, greenish-black; contains light-green, calcareous clay-----	6	321

149-51-1aab

Glacial drift:			
	Soil, black, silty-----	1	1
	Silt, yellowish-gray, clayey, oxidized-----	9	10
	Till, olive-gray, silty, unoxidized-----	55	65
	Clay, olive-gray-----	6	71
	Till, olive-gray, silty-----	7	78
	Clay, greenish-gray; contains light-gray silt laminae-----	14	92
	Till, olive-gray, silty-----	41	133
	Till, olive-gray, silty; contains very fine sand-----	25	158

149-51-15bab

<u>Geologic source</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Glacial drift:	Soil, black, clayey-----	1	1
	Till, dusky-yellow, silty, oxidized-----	15	16
	Till, olive-gray, silty, unoxidized-----	44	60
	Till, olive-gray, silty; contains some sand and gravel-----	21	81
	Till, olive-gray, silty-----	10	91
	Clay, olive-gray, silty; very fine to fine sand-----	31	122
	Clay, olive-gray, silty-----	18	140
	Till, dusky-yellowish-brown, silty-----	15	155
	Clay, grayish-black, silty-----	9	164
	Till, olive-gray, silty to very silty-----	69	233
	Sand, medium to coarse, gravelly-----	6	239
	Till, olive-gray, silty to very silty-----	53	292
	Sand, fine to medium, gravelly-----	21	313
	Clay, olive-gray, very silty-----	9	322
Dakota Group:	Sand, medium, well-sorted, quartzose; inter- bedded light-brownish-gray, silty clay-----	51	373
	Clay, yellowish-gray, silty-----	4	377
Winnipeg Group:	Limestone, yellowish-gray-----	1	378

149-52-5dce

Glacial drift:	Sand, fine, quartzose, angular, oxidized; minor amounts of gravel-----	9	9
	Sand, fine to medium, subangular, unoxidized---	6	15
	Till, dark-greenish-gray to olive-gray, silty--	27	42

149-53-9ccc

Glacial drift:	Soil, black, sandy-----	1	1
	Sand, very fine to fine, poorly sorted-----	4	5
	Silt, light-olive-brown, clayey, oxidized-----	5	10
	Silt, olive-gray, clayey to sandy, unoxidized--	14	24
	Till, olive-gray, very silty-----	33	57
	Till, olive-gray, sandy, becoming very silty with depth-----	77	134
	Silt, olive-gray, clayey to sandy, laminated---	15	149
	Clay, olive-gray, silty-----	6	155
	Till, olive-gray, silty-----	13	168

149-53-14baa

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Soil, black, sandy-----	1	1
	Sand, very fine, poorly sorted, angular, quartzose, oxidized-----	9	10
	Silt, pale-yellowish-brown, clayey, oxidized--	3	13
	Silt, olive-gray, clayey to sandy, unoxidized--	51	64
	Till, olive-gray, silty-----	83	147
	Silt, olive-gray to dark-greenish-gray, clayey	12	159
	Till, olive-gray, silty-----	77	236
	Gravel, poorly sorted, sandy-----	2	238
	Till, olive-gray, silty; poor sample return--	54	292
Belle Fourche Formation:	Shale (?); poor samples-----	6	298
	Limestone and interbedded shale-----	6	304
	Shale, olive-gray, very sandy; sandstone laminae-----	22	326

149-53-28ccc

Glacial drift:	Soil, black, sandy-----	1	1
	Sand, very fine, well-sorted, oxidized-----	20	21
	Silt, dark-greenish-gray, clayey; becomes sandy with depth, unoxidized-----	114	135
	Till, olive-gray, silty; becomes gravelly with depth-----	43	178
	Gravel, fine, sandy-----	21	199
	Till, olive-gray, clayey-----	5	204
	Sand; poor samples-----	2	206
	Till, olive-gray, clayey-----	36	242
	Clay, olive-black, slightly sandy-----	22	264
Belle Fourche Formation:	Clay, olive-black, sandy; light-bluish-gray, bentonitic clay; noncalcareous-----	19	283

149-53-28cdc

Glacial drift:	Soil, black, clayey-----	1	1
	Clay, grayish-orange-----	7	8
	Sand, fine, poorly sorted, oxidized-----	2	10
	Sand, fine, poorly sorted, unoxidized-----	3	13
	Silt, olive-gray, clayey-----	78	91
	Till, greenish-gray, sandy-----	3	94
	Till, olive-gray, sandy-----	34	128
	Gravel, fine; poor samples-----	1	129
	Till, olive-gray, sandy-----	30	159
	Gravel, very poorly sorted-----	4	163
	Till, olive-gray, gravelly-----	27	190
Belle Fourche Formation:	Clay, olive-gray, silty to sandy, very calcareous-----	20	210

149-53-28cdd

<u>Geologic source</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Glacial drift:			
	Soil, black, sandy-----	1	1
	Sand, very fine to medium, subrounded, oxidized	11	12
	Clay, olive-gray, silty, unoxidized-----	9	21
	Silt, olive-gray, clayey; becomes sandy with depth-----	114	135
	Till, olive-gray, silty-----	11	146
	Till, olive-gray, gravelly-----	14	160
	Gravel, very fine to fine, subrounded-----	4	164
	Till, olive-gray, gravelly; driller reports gravel from 182 to 186-----	33	197
	Till, dark-greenish-gray, sandy-----	16	213
Belle Fourche Formation:			
	Clay, olive-gray, calcareous-----	18	231

149-53-29dcd

Glacial drift:			
	Soil, black, sandy-----	1	1
	Sand, moderate-yellowish-brown, clayey to silty, oxidized-----	17	18
	Sand, olive-gray, clayey to silty, unoxidized--	2	20
	Silt, olive-gray, clayey to silty -----	70	90
	Silt, dark-greenish-gray, clayey-----	40	130
	Till, dark-greenish-gray, silty-----	48	178
	Gravel; poor samples-----	2	180
	Till, olive-gray, silty-----	38	218
	Clay, olive-gray, silty-----	15	233
Belle Fourche Formation:			
	Shale, olive-gray, calcareous-----	19	252

149-53-32dad

Glacial drift:			
	Soil, black, sandy-----	1	1
	Sand, grayish-orange, clayey to silty-----	3	4
	Sand, grayish-orange, poorly sorted, very fine, silty, oxidized-----	7	11
	Sand, dark-greenish-gray, clayey to sandy, unoxidized-----	34	45
	Till, olive-gray, very silty-----	83	128
	Till, olive-gray; interbedded silt-----	48	176
	Till, olive-gray, silty-----	8	184
	Sand, poorly sorted, coarse to very coarse, gravelly-----	6	190
	Till, olive-gray, gravelly-----	45	235
Belle Fourche Formation:			
	Clay, olive-black, fossiliferous, calcareous---	17	252

149-54-2cdd

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Soil, black, silty-----	1	1
	Clay, dusky-yellow, silty, oxidized-----	11	12
	Sand, light-olive-gray, clayey, unoxidized----	23	35
	Clay, light-olive-gray-----	69	104
	Till, olive-gray, silty-----	26	130
	Sand, coarse, poorly sorted, gravelly-----	3	133
	Till, olive-gray, silty; small amounts of sand and gravel-----	99	232
	Sand, coarse, poorly sorted, gravelly-----	8	240
	Till, olive-gray, silty; interbedded coarse, gravelly sand-----	38	278
Greenhorn Formation:			
	Clay, yellowish-brown, silty, very calcareous-	26	304

149-54-4ccc

Glacial drift:			
	Soil, black, sandy-----	1	1
	Clay, yellowish-brown, silty, oxidized-----	9	10
	Sand, olive black, fine moderately well-sorted, subangular, unoxidized-----	49	59
	Clay, dark-greenish-gray, silty-----	25	84

149-54-9bdd2

City of Northwood No. 1

(Log furnished by Layne-Minnesota Co.)

Clay-----	20	20
Quicksand-----	15	35
Sandy clay-----	67	102
Gravelly clay-----	34	136
Boulder clay-----	3	139
Black sand-----	13	152
Boulder clay-----	5	157
Black sand-----	3	160
Boulder clay-----	5	165

149-54-9dacl

City of Northwood No. 4

(Log furnished by Layne-Minnesota Co.)

Topsoil-----	2	2
Yellow clay-----	9	11
Black sand, medium dirty-----	20	31
Clean sand (white)-----	7	38
Black sand, medium dirty-----	14	52

149-54-22aab

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Soil, brownish-black, silty-----	1	1
	Silt, moderate-yellowish-brown, oxidized-----	11	12
	Silt, olive-gray, unoxidized-----	3	15
	Sand, very fine, quartzose, very silty to clayey-----	14	29
	Clay, pinkish-gray, calcareous-----	13	42
	Clay, olive-gray, silty-----	11	53

149-55-32abb

Glacial drift:	Soil, dusky-brown, sandy-----	1	1
	Sand, dusky-yellow, fine, well-sorted, quartzose, oxidized-----	12	13
	Till, dusky-yellow, silty to sandy, oxidized--	8	21
	Till, olive-gray, silty to sandy, unoxidized--	4	25
	Sand, medium to coarse, poorly sorted, gravelly-----	5	30
	Till, olive-gray, silty-----	4	34
	Silt, olive-gray, clayey-----	15	49
	Sand, olive-gray, fine, well-sorted, quartzose-----	10	59
	Gravel, fine to medium, poorly sorted-----	5	64
Niobrara Formation:	Clay, light-gray, silty, very calcareous-----	20	84

150-50-7ccd

Glacial drift:	Soil, dusky-brown, silty-----	1	1
	Clay, dusky-yellow, silty, oxidized-----	17	18
	Clay, olive-gray, unoxidized-----	11	29
	Till, olive-gray, silty-----	92	121
	Silt, olive-gray, very calcareous-----	15	136
	Till, olive-gray, silty, very calcareous-----	3	139
	Sand, fine to medium grained, gravelly, quartzose; interbedded grayish-green, silty clay-----	18	157

150-50-9ddd

Glacial drift:	Soil, dusky-brown, clayey-----	1	1
	Clay, dusky-yellow, oxidized-----	21	22
	Clay, light-olive-gray, unoxidized-----	14	36

150-50-9ddd--Continued

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift--Continued:			
	Clay, olive-gray, noncalcareous-----	5	41
	Clay, light-olive-gray-----	40	81
	Till, olive-gray, clayey-----	42	123
	Clay, olive-gray, silty-----	22	145
	Sand, medium to coarse, gravelly, moderately well-sorted, subangular to subrounded-----	3	148
	Clay, olive-gray, silty-----	15	163
	Till, olive-gray, clayey-----	8	171
	Clay, olive-gray to olive-black, silty-----	20	191
	Till, dusky-yellowish-brown, silty to very sandy, gravelly-----	20	211
	Sand, fine to medium, moderately well-sorted, gravelly, quartzose-----	17	228
	Till, dusky-yellowish-brown, sandy to gravelly--	37	265
Winnipeg Group:	Clay, yellowish-gray and moderately reddish- brown, silty, very calcareous-----	40	305

150-50-17dcc

Glacial drift:			
	Soil, black, silty-----	1	1
	Silty, dark-yellowish-orange to pale-yellowish- brown, clayey, noncalcareous-----	15	16
	Clay, olive-gray, silty, slightly calcareous, unoxidized-----	34	50
	Till, olive-gray, clayey, slightly calcareous---	63	113
	Till, olive-gray, sandy to bouldery, very cohesive-----	12	125
	Till, mottled moderate-yellowish-brown to light-brown, silty, very cohesive, oxidized; lignite and limonite concretions abundant----	1	126
	Till, olive-gray, sandy, very cohesive-----	6	132
	Sand, very fine to fine, moderately sorted, angular to subrounded, silty, quartzose-----	7	139
	Till, olive-gray to brownish-gray, sandy to bouldery, cohesive, very calcareous; inter- stratified sand-----	25	164
	Clay, olive-gray to dark-greenish-gray, cohesive, noncalcareous-----	5	169
	Till, olive-gray, sandy, cohesive, calcareous---	19	188
	Gravel, fine to medium, moderately sorted, angular to subangular-----	3	192
	Till, olive-gray, sandy to gravelly, cohesive---	10	202
	Till, brownish-gray, sandy to gravelly, cohesive, very calcareous-----	68	270
	Till, olive-gray, clayey to silty, plastic-----	5	275
Winnipeg Group:	Sand, medium to coarse, subangular to rounded, quartzose; interstratified light-greenish- gray and grayish-orange clay-----	35	310
	Clay, bluish-white to very light-gray, silty, noncalcareous-----	20	330

150-50-23aaa2

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Soil, brownish-black, clayey-----	1	1
	Silt, dusky-yellow to light-olive-brown, clayey, oxidized-----	16	17
	Clay, light-olive-gray, silty-----	17	34
	Clay, light-olive-gray-----	29	63
	Till, olive-gray, silty-----	58	121
	Till, light-olive-gray, sandy to gravelly-----	17	138
	Till, olive-gray, silty-----	13	151
	Till, olive-gray, sandy; minor amounts of gravel-----	45	196
	Clay, olive-black, silty, noncalcareous, hard---	30	226

150-50-25aab

Glacial drift:	Soil, black, silty-----	1	1	
	Silt, pale-yellowish-brown, clayey, slightly calcareous, oxidized-----	12	13	
	Clay, pale-yellowish-brown, silty, slightly calcareous, oxidized-----	5	18	
	Clay, olive-gray, silty, moderately calcareous, unoxidized-----	59	77	
	Till, olive-gray, very clayey, moderately calcareous, very plastic to cohesive-----	56	133	
	Till, olive-gray, silty-----	4	137	
	Clay, olive-gray, slightly silty-----	6	143	
	Till, olive-gray, very clayey, plastic-----	33	176	
	Gravel, medium, moderately sorted, angular to subangular-----	2	178	
	Till, olive-gray, clayey, very cohesive-----	20	198	
	Clay, olive-gray to olive-black, plastic, very compact-----	20	218	
	Till, olive-gray, sandy, slightly calcareous---	7	225	
	Gravel, medium to coarse, poorly sorted, sub- angular to subrounded, bouldery-----	19	244	
	Winnipeg Group:	Silt, moderate-yellowish-brown, very sandy, cohesive, very calcareous-----	15	259
		Clay, light-greenish-gray, very silty; inter- stratified greenish-gray, sandy silt-----	11	270

150-50-28aaa

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Soil, brownish-black, silty-----	1	1
	Silt, dusky-yellow, clayey, oxidized-----	7	8
	Clay, dusky-yellow, silty, oxidized-----	12	20
	Clay, light-olive-gray, unoxidized-----	55	75
	Till, olive-gray, silty-----	112	187
	Gravel, fine to medium, sandy, moderately poor sorting-----	17	204
	Sand, medium to coarse, well-sorted, quartzose--	49	253
	Sand, coarse, quartzose, gravelly-----	22	275

150-50-28ddd

Glacial drift:			
	Soil, brownish-black, silty-----	1	1
	Silt, moderate-brown to brownish-gray, clayey, oxidized-----	20	21
	Clay, medium-light-gray to olive-gray, silty, unoxidized-----	9	30
	Clay, olive-gray, silty-----	25	55
	Till, olive-gray, silty-----	70	125
	Sand, quartzose, gravelly; poor samples-----	5	130
	Sand, coarse, moderately sorted, angular to subrounded, quartzose-----	29	159
	Till, olive-gray to medium-dark-gray, silty, moderately calcareous-----	25	184
	Sand, coarse, well-sorted, quartzose-----	7	191
	Till, olive-gray to medium-dark-gray, silty, sandy-----	9	200
	Gravel, coarse, poorly sorted, bouldery-----	14	214
	Till, olive-gray, sandy to gravelly; poor samples-----	15	229
	Clay, olive-gray, silty, slightly calcareous---	10	239
Winnipeg Group:			
	Clay, grayish-brown to medium-brown, moderately calcareous-----	16	255
	Clay, variegated grayish-brown to greenish- gray, moderately calcareous; hard streaks of limestone-----	17	272

150-50-29add

<u>Geologic source</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Glacial drift:			
	Soil, brownish-black-----	1	1
	Silt, pale-yellowish-brown, sandy, oxidized----	14	15
	Clay, olive-gray to dark-greenish-gray, silty, unoxidized-----	36	51
	Till, olive-gray to dark-greenish-gray-----	62	113
	Sand, fine; poor samples-----	8	121
	Clay, olive-gray, silty-----	2	123
	Boulders, granite-----	3	126
	Hole abandoned		

150-51-1bbb

Glacial drift:			
	Soil, dark-brownish-black, silty-----	1	1
	Silt, yellowish-gray to dusky-yellow, oxidized-	5	6
	Clay, yellowish-gray; mottled light-gray and moderate-yellowish-brown clay and silt, oxidized-----	11	17
	Clay, olive-gray, unoxidized-----	12	29
	Till, olive-gray, silty-----	2	31
	Till, olive-gray, clayey-----	43	74
	Till, olive-gray, very sandy-----	17	91
	Till, dark-yellowish-brown, very sandy-----	20	111
	Till, olive-black, silty to clayey-----	15	126
	Gravel, poorly sorted, sandy-----	5	131
	Till, olive-gray, sandy to silty, very calcareous-----	46	177
	Sand, light-brownish-gray, poorly sorted, fine to very coarse, quartzose-----	1	178
	Till, olive-black, sandy to silty-----	6	184
	Sand, light-brownish-gray, poorly sorted, fine to very coarse, quartzose; medium-light-gray, clayey silt at 189-----	9	193
	Till, olive-gray, silty-----	47	240
	Sand, medium-dark-gray, very silty; minor amounts of gravel-----	8	248
	Till, olive-gray, sandy to silty-----	22	270
	Till, dusky-yellowish-brown, sandy-----	33	303
	Gravel; poor samples-----	3	306
	Till, dusky-yellowish-brown, sandy-----	12	318
	Till, olive-black, silty-----	43	361
	Till, dark-reddish-brown, silty to gravelly----	13	374
Winnipeg Group:			
	Sandstone, light-gray to dusky-yellow, very fine to fine, cemented with silicic; laminae of light-greenish-gray, noncalcareous, silt-----	4	378

150-51-8ccc

Glacial drift:			
	Soil, dark-brownish-black, silty-----	1	1
	Till, dusky-yellow, silty, oxidized-----	16	17
	Till, olive-gray, silty, unoxidized-----	51	68
	Clay, light-olive-gray to olive-gray; light-gray silt laminae-----	19	87

150-51-8ccc--Continued

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift--Continued:			
	Till, olive-gray, silty to sandy-----	30	117
	Till, dusky- yellowish-brown, sandy to gravelly-----	16	133
	Till, olive-gray, clayey-----	10	143
	Till, olive-gray, silty-----	7	150
Dakota Group:			
	Sand, medium to coarse; fine gravel, moderately well-sorted, quartzose-----	4	154

150-51-15aaa

Glacial drift:			
	Soil, brownish-black, sandy-----	1	1
	Sand, medium to coarse; gravelly, poorly sorted-----	2	3
	Till, dusky-yellow, silty, oxidized-----	14	17
	Till, olive-gray, very calcareous, unoxidized--	50	67
	Clay, grayish-black, silty, very calcareous----	11	78
	Till, dusky-yellowish-brown (oxidized ?), silty, very calcareous-----	24	102
	Till, olive-gray, silty, very calcareous-----	10	112
Dakota Group:			
	Sand, fine to medium, well-sorted, subangular to subrounded, quartzose-----	6	118
	Clay, olive-black, silty, noncalcareous-----	29	147

150-51-27ccc

Glacial drift:			
	Soil, dusky-brown, clayey-----	1	1
	Till, dusky-yellow, silty, oxidized-----	13	14
	Till, olive-gray, silty, unoxidized-----	33	47
	Silt, olive-gray, clayey, very calcareous-----	4	51
	Till, dark-olive-gray, silty-----	17	68
	Sand, very fine to fine, well-sorted, sub- angular to subrounded, quartzose-----	5	73
	Clay, olive-gray to brownish-gray-----	27	101
	Till; poor samples-----	56	157
	Silt, olive-gray, clayey, very calcareous-----	38	195
	Clay, greenish-black to olive-black, silty----	29	224
Winnipeg Group:			
	Sand, very fine to fine, well-sorted, quartzose, lignitic; clay laminae-----	59	283

150-51-27ddd

<u>Geologic source</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Glacial drift:	Soil, brownish-black, sandy-----	1	1
	Sand, fine, well-sorted, subrounded-----	1	2
	Till, grayish-orange, gypsiferous, oxidized---	10	12
	Till, olive-gray to dark-greenish-gray, silty, unoxidized-----	62	74
	Clay, dark-greenish-gray to medium-bluish- gray, silty-----	9	83
	Till, olive-gray, very calcareous-----	37	120
	Till, olive-gray to dark-greenish-gray, silty-	5	125
	Gravel, poorly sorted, sandy-----	8	133
	Till, olive-gray to dark-greenish-gray, sandy, very calcareous-----	13	146
	Clay, olive-gray to dark-greenish-gray, silty, very calcareous-----	31	177
	Till, olive-gray, silty, very calcareous-----	48	225
	Till (?), olive-gray, very silty, very calcareous-----	36	261
	Silt, olive-gray; very fine sand laminae-----	52	313
	Till, olive-gray, sandy, very calcareous-----	4	317
	Gravel, poorly sorted, angular to rounded-----	8	325
Dakota Group:	Clay, light-brown to black variegated, silty, noncalcareous; interbedded coarse, angular to rounded, quartzose sand-----	29	354
	Clay, greenish-gray to light-bluish-gray, noncalcareous-----	2	356
Precambrian:	Granite-----	1	357

150-51-30ccc

Glacial drift:	Soil, brownish-black, sandy-----	1	1
	Gravel, poorly sorted, subangular to sub- rounded-----	1	2
	Till, grayish-orange, clayey, oxidized-----	5	7
	Till, olive-gray to dark-greenish-gray, very silty, unoxidized-----	35	42

150-51-30ddd

Glacial drift:	Soil, black, clayey-----	1	1
	Till, dusky-yellow, silty, oxidized-----	5	6
	Till, olive-gray, silty, unoxidized-----	47	53
	Till, olive-gray, silty; interstratified fine to medium, quartzose sand-----	12	65
	Clay, olive-black, very calcareous-----	4	69
	Till, olive-gray, sandy, very calcareous-----	40	109
	Silt, light-olive-gray, clayey, very calcareous	61	170
	Till, olive-gray, silty; interstratified medium to coarse sand; fine to medium, poorly sorted gravel-----	20	190

150-51-30ddd--Continued

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Dakota Group--Continued:			
	Clay, olive-black, silty, noncalcareous; light-gray silt laminae-----	30	220
150-51-36aaa			
	Soil, dark-brown, silty-----	1	1
	Clay, light-brown to pale-olive-gray, silty, oxidized-----	13	14
	Till, olive-gray to dark-greenish-gray, silty, unoxidized-----	70	84
	Sand, very fine, moderately well-sorted, angular-----	2	86
	Till, olive-gray to dark-greenish-gray, silty--	21	107
	Gravel, very poorly sorted, angular-----	3	110
	Till, olive-gray mottled-light-brown, clayey--	11	121
	Gravel, poorly sorted, sandy-----	25	146
	Boulders-----	1	147
	Hole abandoned		
150-52-34bbb			
Glacial drift:			
	Soil, brownish-black, sandy-----	1	1
	Sand, very fine to fine, well-sorted, quartzose; gravel lense-----	8	9
	Till, dusky-yellow, clayey, oxidized-----	1	10
	Till, olive-gray, clayey, unoxidized-----	87	97
	Sand, fine to medium, well-sorted, quartzose, subangular to subrounded-----	6	103
	Till, olive-gray, silty-----	4	107
	Sand, very fine to fine, well-sorted, quartzose, subangular to subrounded-----	8	115
	Till, olive-gray, silty-----	4	119
	Sand, very fine to fine, well-sorted, quartzose--	6	125
	Till, olive-gray, silty-----	10	135
	Sand, very fine to fine, well-sorted, quartzose--	8	143
	Till, olive-gray, sandy-----	79	222
Winnipeg Group:			
	Clay, olive-black, very silty, noncalcareous; light-gray silt laminae-----	16	238
	Limestone, light-gray, sucrosic-----	1	239
	Clay, dusky-brown, silty, noncalcareous-----	13	252

150-53-7aab

<u>Geologic source</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Glacial drift:	Soil, brownish-black, sandy-----	1	1
	Sand, coarse, well-sorted, angular to rounded, clayey, oxidized-----	8	9
	Sand, coarse, well-sorted, angular to rounded, unoxidized-----	11	20
	Silt, olive-gray, sandy-----	5	25
	Sand, coarse to very coarse, well-sorted, subrounded; predominately shale fragment----	47	72
	Till (?), olive-gray, very silty to sandy-----	44	116

150-54-1dda

Glacial drift:	Soil, brown, sandy-----	1	1
	Sand, brown, very fine to fine, quartzose, silty-----	2	3
	Clay, dark-brownish-gray to light-gray, silty, oxidized-----	5	8
	Sand, mottled dark-gray and white, fine, moderately well-sorted, subangular to subrounded, quartzose; medium grained with depth-----	23	31
	Sand, mottled dark-gray and white, very fine to fine, silty; predominately shale fragment---	11	42
	Till, olive-gray, clayey-----	5	47
	Sand, dark-gray, very fine to fine, very silty-	4	51
	Silt, medium-gray, clayey; light-gray silt laminae-----	24	75
	Silt, medium-gray, very clayey; numerous white spots-----	7	82
	Till, dark-olive-gray, clayey-----	33	115
	Till, olive-gray, silty to sandy-----	11	126
	Till, olive-gray, clayey to silty-----	30	156
	Gravel, fine, subangular to subrounded-----	2	158
	Till, olive-gray, very sandy; interstratified poorly sorted gravel from 169 to 197-----	39	197
	Till, olive-gray, sandy-----	106	303
Belle Fourche Formation:	Shale, olive-gray, hard, calcareous; sand laminae, white, fine-----	33	336
	Limestone, lithographic-----	1	337
	Shale, olive-gray, very calcareous; bluish- white clay laminae-----	9	346

150-54-4aaa

Glacial drift:	Soil, brownish-black, sandy-----	2	2
	Sand, very fine to fine, angular to subangular, quartzose oxidized-----	4	6

150-54-4aaa--Continued

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift--Continued:			
	Sand, very fine to fine, angular to subangular, unoxidized-----	44	50
	Sand, very fine; angular to subangular, quartzose-----	13	63
	Silt, olive-gray; poor samples-----	21	84

150-54-4ccd

Glacial drift:			
	Soil, brownish-black, silty-----	1	1
	Silt, yellowish-gray, sandy, oxidized-----	8	9
	Silt, dark-greenish-gray to olive-gray, clayey--	16	25
	Sand, very fine, angular to subangular, poorly sorted-----	6	31
	Sand, fine, angular to subrounded, moderate poorly sorted-----	11	42
	Clay, olive-gray to dark-greenish-gray, silty--	64	106
	Till, olive-gray to dark-greenish-gray-----	8	114
	Gravel, poorly sorted, angular to rounded-----	4	118
	Till, olive-gray to dark-greenish gray-----	8	126

150-54-7bbb

Glacial drift:			
	Soil, dark-brownish-black, sandy-----	1	1
	Silt, yellowish-brown, sandy-----	2	3
	Sand, very fine, moderately well-sorted, angular to rounded, shale fragments predominate; fine to medium-grained sand increases with depth-----	36	39
	Silt, dark-greenish-gray to olive-gray, sandy---	34	73

150-54-7dbc

(Log furnished by Great Northern R.R.)

Black soil-----	5	5
Yellow clay-----	5	10
Fine red sand-----	10	20
Quick sand-----	14	34
Fine black sand-----	8 $\frac{1}{2}$	42 $\frac{1}{2}$

150-54-8abb

<u>Geologic source</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Glacial drift:	Soil, dark-brown, sandy-----	1	1
	Sand, fine, well-sorted, quartzose, clayey----	2	3
	Sand, fine, well-sorted, subangular to sub- rounded-----	41	44
	Clay, light-olive-gray-----	66	110
	Till, olive-gray, silty-----	152	262
Greenhorn Formation:	Clay, olive-black, silty, very calcareous-----	22	284

150-54-10aaa

Glacial drift:	Soil, brownish-black, sandy-----	1	1
	Sand, very fine to fine, subangular to sub- rounded, oxidized-----	12	13
	Silt, dark-yellowish-brown, sandy, oxidized---	1	14
	Silt, olive-gray, sandy, unoxidized-----	3	17
	Sand, very fine to fine, angular to subrounded, quartzose-----	49	66
	Till, olive-gray, very silty-----	7	73

150-54-19aaa

Glacial drift:	Soil, brownish-black, silty-----	1	1
	Silt, yellowish-brown to moderate-yellowish- brown, clayey-----	8	9
	Sand, very fine, angular, quartzose, oxidized--	5	14
	Sand, very fine, angular, quartzose, unoxidized	22	36
	Sand, very fine to fine, subangular to sub- rounded, quartzose; interbedded gravel-----	6	42
	Clay, olive-gray, silty-----	21	63

150-54-24daa

Glacial drift:	Soil, brownish-black, silty-----	2	2
	Silt, moderate-yellowish-brown, very sandy, oxidized-----	10	12
	Silt, olive-gray, very sandy, unoxidized-----	3	15
	Sand, very fine to fine, angular to subangular, quartzose-----	28	43
	Till, olive-gray, very silty-----	20	63

150-55-8bbb

<u>Geologic source</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Glacial drift:			
	Soil, brownish-black, very silty-----	1	1
	Till, dusky-yellow, silty, very calcareous, oxidized-----	7	8
	Sand, medium to coarse, poorly sorted, gravelly, oxidized-----	2	10
	Till, dusky-yellow to yellowish-gray, silty, oxidized-----	6	16
	Till, olive-gray, silty, unoxidized-----	21	37
	Gravel, fine, poorly-sorted; sand, medium to coarse, poorly sorted-----	6	43
	Till, olive-gray, silty-----	4	47
	Sand, medium to coarse, poorly sorted, sub- angular to subrounded, gravelly-----	5	52
Niobrara Formation:			
	Clay, light-olive-gray, silty, calcareous---	22	74

150-55-11aba

Glacial drift:			
	Soil, brownish-black, sandy-----	1	1
	Silt, grayish-orange, sandy, oxidized-----	8	9
	Sand, fine, moderately well-sorted, angular to rounded, unoxidized-----	10	19
	Silt, dark-greenish-gray to olive-gray, very clayey-----	17	36
	Till, dark-greenish-gray to olive-gray, very silty to sandy-----	14	50
	Till, olive-gray to dark-greenish-gray; inter- stratified sandy, poorly sorted gravel----	23	73
	Boulders-----	2	75
	Abandoned hole		

151-50-3cbd

(Log from unpublished report by
Greenlee and Akin
1945)

Glacial drift:			
	Soil-----	18	18
	Silt-----	82	100
	Boulder drift-----	80	180
	Glacial drift (many rocks)-----	17	197
	Blue clay or fine shale-----	13	210
	Soft muddy clay-----	2	212
	White sand-----	13	225

151-50-4ccd

(Log from unpublished report by
Greenlee and Akin
1945)

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Black soil-----	3	3
	Yellow clay-----	42	45
	Blue clay-----	10	55
	Black shale-----	98	153
	Gray sand-----	15	168
	Sand and shale-----	36	204
	Black shale-----	20	224
	White sand (artesian)-----	14	238
	Dark sand-----	3	241
	Red shale-----	26	267
	White sand (artesian)-----	39	306

151-50-5acd

Glacial drift:			
	Soil, brownish-black, silty-----	1	1
	Silt, pale-yellowish-brown, clayey, oxidized--	7	8
	Clay, pale-yellowish-brown, silty, noncalcare- ous, oxidized-----	8	16
	Clay, olive-gray, slightly calcareous; medium- gray silt laminae-----	15	31

151-50-5ccc

(Log furnished by Great Northern R.R.)

	Yellow clay-----	15	15
	Soft blue clay-----	127	142
	Gravel and sand-----	6	148

151-50-6dad

Glacial drift:			
	Soil, dark-brownish-black, silty-----	1	1
	Silt, yellowish-gray and dusky-yellow laminae, oxidized-----	17	18
	Silt, olive-gray and light-gray laminae, unoxidized-----	2	20
	Clay, olive-gray, silty-----	12	32
	Clay, olive-gray, very silty-----	44	76
	Till, olive-gray, clayey-----	64	140
	Clay, dark-greenish-gray; light-gray silt laminae-----	47	187

151-50-6dad--Continued

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (Feet)	<u>Depth</u> (feet)
Glacial drift--Continued:			
	Till, olive-gray, sandy-----	10	197
	Gravel, poorly sorted, very fine to fine, angular to subrounded, sandy; driller reports till from 199 to 201-----	20	217
	Gravel, poor to moderate sorting, fine, sandy---	5	223
	Till, brownish-gray to olive-gray, sandy to very gravelly-----	39	262
	Sand, mottled gray, fine to very coarse, poorly sorted, gravelly-----	5	267
Winnipeg Group:			
	Shale, pale-yellowish-green, noncalcareous-----	5	272
	Shale, variegated green-gray-red, noncalcareous-	7	279
	Sandstone, dark-reddish-brown, fine, well-sorted, very clayey, iron oxide cement-----	15	294

151-50-17abb

Glacial drift:			
	Soil, black, silty-----	2	2
	Silt, grayish-orange to pale-yellowish brown, clayey, slightly calcareous, oxidized-----	7	9
	Clay, grayish-orange to pale-yellowish-brown, silty, slightly calcareous, oxidized-----	7	16
	Clay, olive-gray, silty, moderately calcareous, unoxidized-----	54	70
	Till, olive-gray, silty to sandy-----	15	85
	Till, olive-gray, clayey, plastic-----	34	119
	Clay, olive-gray, very plastic-----	18	137
	Till, olive-gray, silty, very compact-----	12	149
	Clay, grayish-black, very cohesive, slightly calcareous-----	15	164
	Till, olive-gray, very silty, very calcareous---	6	170
	Sand, very fine to fine, poorly sorted, angular to subangular, quartzose-----	15	185
	Till, olive-gray, sandy to gravelly, very calcareous-----	13	198
	Silt, moderate-reddish-brown to light-brown, compact, very calcareous; contains light- olive-gray silt laminae-----	10	208
	Gravel; poor samples-----	6	214
	Till, brownish-gray, sandy, compact, very calcareous; interstratified sand-----	54	268
	Sand, medium to coarse, poorly sorted, sub- angular to subrounded, gravelly-----	5	273
	Till, brownish-gray, sandy, compact, very calcareous-----	15	288
	Sand, medium to coarse, well-sorted, sub- angular to rounded, quartzose, gravelly-----	5	293
Winnipeg Group:			
	Clay, grayish-orange to dark-yellowish-orange, silty, very calcareous; interstratified brownish-gray, microcrystalline limestone----	6	299
	Limestone, light-brownish-gray, speckled pale- reddish-brown, microcrystalline-----	21	320

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Soil, dark-brownish-black, silty-----	1	1
	Silt, yellowish-gray and very light-gray laminae, oxidized-----	4	5
	Clay, yellowish-gray to light-olive-gray, oxidized-----	11	16
	Clay, olive-gray and light-gray laminae, unoxidized-----	58	74
	Till, olive-gray, silty-----	54	128
	Sand, pale-yellowish-brown, fine, moderately well-sorted, rounded to subrounded quartzose-----	6	134
	Sand, coarse to very coarse, well-sorted, sub- rounded to well rounded, quartzose-----	9	143
	Gravel, fine to medium, poorly sorted-----	4	147
	Till, olive-gray, silty to sandy-----	41	188
	Till, dark-yellowish-brown, very sandy, very calcareous-----	4	192
	Gravel, fine to medium, poorly sorted, angular to subangular, sandy-----	10	202
	Till, dark-yellowish-brown, sandy, very calcareous-----	18	220
	Sand, fine, well-sorted, angular to subrounded, quartzose-----	15	235
Winnipeg Group:	Shale, pale-reddish-brown, noncalcareous; inter- bedded very light-gray to light-greenish- gray shale-----	6	241
	Shale, dusky-red, noncalcareous-----	2	243
	Shale, moderate-yellow, very calcareous-----	2	245
	Limestone, grayish-red, microcrystalline-----	7	252

151-50-30aab

Glacial drift:	Soil, black, silty-----	1	1
	Silt, dark-yellowish-brown to pale-yellowish- brown, clayey, slightly calcareous, oxidized-	9	10
	Clay, grayish-orange to pale-yellowish-brown, silty, plastic, oxidized-----	9	19
	Clay, olive-gray, slightly silty, plastic, unoxidized-----	31	50
	Till, olive-gray, silty, moderately calcareous--	9	59
	Gravel, fine to medium, poorly sorted, sub- angular to subrounded, sandy, quartzose-----	6	65
	Till, olive-gray, very sandy, moderately calcareous; interstratified gravel from 115 to 121-----	56	121
	Till, olive-gray, silty to sandy-----	3	124
	Clay, olive-gray to olive-black, slightly silty, very compact-----	35	159
	Till, olive-gray, silty, very calcareous-----	18	177
	Gravel, fine to medium, poorly sorted, sub- angular to subrounded, sandy-----	3	180
	Till, brownish-gray, sandy, cohesive; inter- stratified sand-----	20	200

151-50-30aab--Continued

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift--Continued:			
	Sand, fine, well-sorted, subrounded to rounded, quartzose-----	53	253
	Till, brownish-gray to olive-gray, very silty to sandy, cohesive; driller reports interstratified sand strata, no sand samples-----	25	278
	Till, grayish-black, very silty-----	2	280
Winnipeg Group:			
	Clay, light-greenish-gray to greenish-gray, silty, very calcareous; variegated bluish-white, orange-pink, and light-brown silty clay; interstratified fine-grained sandstone containing well rounded quartz grains and pyrite cement-----	5	285

151-50-33add

Glacial drift:			
	Soil, black, clayey-----	2	2
	Silt, moderate-brown to brownish-gray-----	3	5
	Clay, moderate-brown to brownish-gray, silty, oxidized-----	12	17
	Clay, olive-gray to medium-light-gray, silty, unoxidized-----	8	25
	Till, olive-gray, silty; becomes more cohesive with depth-----	45	70
	Till, olive-gray, silty-----	45	115
	Clay, olive-gray, slightly silty, slightly calcareous-----	25	140
	Till, dark-greenish-gray, sandy-----	11	151
	Sand, coarse, well-sorted, subangular to subrounded, quartzose-----	6	157
	Till, olive-gray, sandy-----	17	174
	Clay, brownish-gray to olive-gray, very cohesive, silty-----	15	189
	Till, light-brownish-gray to brownish-gray, silty, oxidized; very gravelly from 195 to 201 feet-----	16	205
	Till, olive-gray, sandy-----	5	210
	Clay, brownish-gray to dark-gray, very cohesive, sandy, gravelly-----	7	217
Winnipeg Group:			
	Clay, light-pinkish-gray to very-light-gray, smooth, very calcareous-----	13	230
	Clay, grayish-pink to pale-reddish-brown, very calcareous; fine-grained, mottled, grayish-red, cherty limestone-----	20	250

151-51-2bbb

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Soil, dark-brownish-black, silty-----	1	1
	Silt, yellowish-gray, clayey, oxidized-----	4	5
	Clay, yellowish-gray, oxidized-----	4	9
	Clay, olive-gray, unoxidized-----	41	50
	Till, olive-gray; very few pebbles-----	20	70
	Till, olive-gray, silty-----	19	89
	Gravel, fine, moderately sorted, subangular---	1	90
	Till, pale-brown, sandy to gravelly-----	9	99
	Till, olive-gray, silty-----	4	103
	Sand, mottled medium-light-gray, coarse to very coarse, well-sorted, subrounded to rounded, quartzose-----	4	107
	Till, olive-gray, silty-----	21	128
	Till, dark-greenish-gray, sandy-----	27	155
	Clay, medium-dark-gray, silty-----	6	161
	Till, olive-gray, silty-----	28	189
	Till, olive-gray, sandy-----	4	193
	Till, brownish-gray-----	22	215
Red River Formation:	Shale, light-greenish-gray, slightly silty, calcareous-----	3	218
	Limestone, very pale-orange to bluish-white, microcrystalline-----	1	219

151-51-4ada

Glacial drift:	Soil, black, clayey-----	4	4
	Till, moderate-yellowish-brown, clayey, oxidized-----	5	9
	Till, olive-gray, clayey to silty; clay increases with depth; oxidized-----	52	61
	Sand, dark-gray, very fine to fine, moderate sorting, silty-----	5	66
	Clay, grayish-black-----	16	82
	Till, dark-yellowish-brown, silty-----	35	117
Dakota Group:	Clay, grayish-black-----	27	144
	Sand, medium-gray, very fine to fine, well- sorted, subrounded to rounded, quartzose--	14	158

151-51-4bbb

Glacial drift:	Soil, brownish-black, silty-----	1	1
	Silt, yellowish-gray to moderate-yellowish- brown, clayey, oxidized-----	4	5
	Clay, yellowish-gray to greenish-gray, silty, oxidized-----	7	12
	Clay, yellowish-gray to light-olive-gray, silty, oxidized-----	7	19
	Till, olive-gray, silty-----	15	34
	Clay, olive-black, silty-----	39	73

151-52-1aaa

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
	Road fill-----	4	4
Glacial drift:	Silt, dusky-yellow to light-olive-gray, clayey, oxidized-----	4	8
	Clay, dusky-yellow to light-olive-brown, oxidized-----	7	15
	Till, dusky-yellow, clayey, oxidized-----	9	24
	Till, olive-gray, clayey, unoxidized-----	5	29
	Sand, mottled light-olive-gray, fine to medium, moderately well-sorted, subrounded, quartzose; coarsens with depth-----	12	41
	Sand, mottled gray, coarse to very coarse, poorly sorted, gravelly; medium-gray, silt laminae-----	5	46
	Till, olive-gray, clayey to silty-----	7	53
	Silt, olive-gray, clayey-----	5	58
	Clay, dark-gray, silty-----	16	74
	Till, dusky-yellowish-brown to grayish-brown, silty to sandy-----	44	118
	Silt, dark-gray, clayey; medium-light-gray silt laminae-----	3	121
	Till, olive-gray, silty-----	11	132
Dakota Group:	Silt, olive-gray to grayish-black, very clayey	9	141
	Sand, light-olive-gray, fine to very coarse, poorly sorted, silty, quartzose-----	5	146
	Sand, light-olive-gray, coarse to very coarse, well-sorted, quartzose-----	12	158

151-52-6aaa

Glacial drift:	Soil, black, silty-----	1	1
	Till, dusky-yellow, silty, oxidized-----	9	10
	Till, olive-gray, silty, unoxidized-----	34	44
	Till, olive-gray, very sandy-----	24	68
	Gravel, fine to medium, subangular to subrounded, sandy-----	2	70
	Till, olive-gray; interbedded fine, sandy gravel-----	35	105

151-52-6bab

	Road fill-----	2	2
Glacial drift:	Till, moderate-yellowish-brown, silty, oxidized	10	12
	Till, olive-gray, silty, unoxidized-----	18	30
	Till, olive-gray, clayey-----	22	52
	Silt, olive-gray to medium-gray-----	30	82
	Sand, light-brownish-gray, coarse, moderately well-sorted, subrounded to rounded, quartzose	7	89
	Till, olive-gray, sandy to silty-----	13	102
	Till, light-olive-gray, silty to sandy-----	29	131

151-52-6bab--Continued

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift--Continued:	Sand, light-olive-gray, fine, well-sorted, silty-----	3	134
	Till, olive-gray, very silty, very calcareous; poorly sorted, sandy gravel from 138 to 142	29	163
Dakota Group:	Silt, dark-gray, noncalcareous; light-gray silt laminae-----	16	179
	Shale, dark-gray, noncalcareous-----	26	205
	Shale, light-olive-gray, clayey, noncalcareous-	5	210

151-52-17bbb

Glacial drift:	Soil, brownish-black, silty-----	1	1
	Till, dusky-yellow, silty, oxidized-----	11	12
	Till, olive-gray, silty, unoxidized-----	41	53
	Clay, olive-gray, silty-----	27	80
	Silt, olive-gray mottled light-olive-gray, clayey-----	13	93
	Sand, coarse to very coarse, moderate sorting, subangular to subrounded, quartzose, gravelly-----	4	97
	Till, olive-gray, silty-----	18	115

151-52-36ccc
(Log furnished by Agricultural Research Service)

Glacial drift:	Soil, black, sandy-----	1	1
	Till, moderate-yellowish-brown, sandy, oxidized-	12	13
	Till, light-olive-gray, silty to clayey, un- oxidized-----	32	45
	Till, olive-gray, very sandy-----	15	60
Dakota Group:	Sand, moderate-brownish-gray, fine to coarse, well-sorted, subrounded to rounded; quartzose	22	82
	Sand, brownish-gray, medium, well-sorted, sub- angular to subrounded, quartzose-----	5	87
	Sand, brownish-gray, fine, subangular, quartzose; silty near base-----	25	112
	Sand, brownish-gray, medium, well-sorted, sub- angular to subrounded, quartzose, lignitic---	37	149
	Shale, olive-gray to olive-black, light-gray laminations; silty near base; numerous small red specks-----	18	167

151-53-Labb

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Soil, brown, silty-----	1	1
	Till, dusky-yellow, silty, oxidized-----	20	21
	Till, olive-gray, silty, unoxidized; light-gray till from 42 to 44-----	93	114
	Till, olive-gray, sandy to gravelly-----	54	168
	Till, olive-gray, sandy-----	11	179
	Sand, medium to coarse, poorly sorted, sub- angular to subrounded, gravelly-----	17	196
	Till, olive-gray, silty-----	60	256
	Sand, medium to coarse, moderate sorting, sub- angular to subrounded-----	4	260
	Till, olive-gray, silty-----	4	264
Dakota Group:			
	Clay, olive-black, noncalcareous; light-gray, calcareous, silt laminae-----	20	284

151-53-lbba

Glacial drift:			
	Soil, brownish-black, sandy-----	1	1
	Sand, medium to coarse, poorly sorted, angular to subrounded-----	1	2
	Till, moderate-yellowish-brown, very silty, oxidized-----	4	6
	Till, olive-gray to dark-greenish-gray, very silty, unoxidized-----	66	72
	Till, olive-gray to dark-greenish-gray, very clayey-----	11	83
	Sand, medium, moderate poorly sorted, angular to subangular-----	10	93
	Till, medium-gray to greenish-gray, silty, very calcareous; interstratified gravel from 98 to 103; poor samples-----	10	103
	Gravel, poorly sorted, angular to subangular, sandy-----	5	108
	Till, medium-gray to greenish-gray, silty-----	4	112
	Gravel, poorly sorted, angular to subangular, sandy, iron stained-----	5	117
	Till, olive-gray, silty to gravelly-----	9	126

151-53-1ccc

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Soil, black, sandy-----	1	1
	Sand, dusky-yellow, fine to medium, moderate sorting, quartzose, oxidized-----	5	6
	Till, dusky-yellow, silty, oxidized-----	4	10
	Till, olive-gray, silty, oxidized-----	40	50
	Clay, olive-gray, slightly calcareous-----	29	79
	Sand, medium to very coarse, poorly sorted, gravelly; shale fragments predominate-----	15	94
	Till, olive-gray, silty-----	22	116

151-53-1dcd

(Log furnished by Great Northern R.R.)

Black clay-----	25	25
Light gray clay-----	11	36
Blue clay-----	14	50
Quicksand-----	30	80
Soft yellow clay-----	5	85
Fine sand--water-----	1	86
Sand-----	3	89
Sand and some gravel-----	1	90

151-54-5ccc

Glacial drift:	Soil, brownish-black, very sandy-----	2	2
	Sand, pale-brown, fine to very coarse, poorly sorted, subangular to subrounded, quartzose; olive-gray near base-----	12	14
	Silt, olive-black, clayey-----	28	42

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Soil, brownish-black, sandy-----	1	1
	Sand, pale-yellowish-brown, fine to medium, well-sorted, subangular to subrounded, oxidized-----	10	11
	Clay, pale-yellowish-brown, very silty, oxidized-----	5	16
	Clay, olive-gray, very silty, unoxidized-----	4	20
	Till, olive-gray, clayey-----	22	42
	Sand, medium to coarse, poorly sorted, sub- angular to subrounded, gravelly-----	6	48
	Till, olive-gray, clayey-----	15	63
	Sand, medium to coarse, poorly sorted, sub- angular to subrounded, gravelly-----	4	67
	Till, olive-gray, very silty-----	57	124
	Till, olive-gray, very silty; interstratified sand and gravel-----	56	180
	Till, olive-gray, silty-----	18	198
	Till, olive-gray, very silty-----	29	227
	Till, olive-gray, clayey to silty-----	110	337
Niobrara Formation:	Clay, olive-black, silty, calcareous-----	20	357

151-54-20ccc

Glacial drift:	Roadfill-----	1	1
	Silt, pale-yellowish-brown, clayey, laminated--	8	9
	Sand, pale-brown, fine to medium, poorly sorted, silty, oxidized-----	10	19
	Sand, dark-gray, medium, well to moderately sorted, subangular to subrounded, quartzose, unoxidized-----	27	46
	Silt, dark-gray, clayey; light-gray silt laminae-----	17	63

151-54-21ddd

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Soil, brownish-black, sandy-----	1	1
	Sand, very fine to fine, angular to sub- angular, quartzose, oxidized-----	11	12
	Sand, fine, subangular to subrounded, quart- zose, oxidized-----	13	25
	Sand, fine, subangular to subrounded, quart- zose, unoxidized-----	8	33
	Till, olive-gray, very silty-----	21	52

151-55-3aba

	Soil, brownish-black, sandy to silty-----	2	2
	Silt, pale-yellowish-brown, very sandy, oxidized-----	2	4
	Sand, very fine to fine, subangular, quartzose, silty, oxidized-----	5	9
	Sand, fine, angular to subangular, oxidized---	12	21
	Sand, grayish-black, fine, angular to sub- angular, unoxidized; sand is coarser near base-----	19	40
	Clay, grayish-black-----	12	52

151-55-11abb

Glacial drift:	Soil, brownish-black, silty-----	2	2
	Silt, pale-yellowish-brown, sandy, very calcareous, oxidized-----	2	4
	Sand, very fine to fine, angular to sub- angular, quartzose, silty, oxidized-----	10	14
	Sand, fine, subangular, quartzose, oxidized---	7	21
	Sand, fine, subangular, quartzose, unoxidized-	14	35
	Clay, olive-gray, slightly calcareous-----	17	52

151-55-11ccc

Glacial drift:	Soil, brownish-black, sandy-----	1	1
	Sand, light-olive-gray, fine to medium, sub- angular to subrounded, oxidized-----	23	24
	Sand, olive-black, fine to medium, well-sorted, subangular to subrounded, unoxidized-----	16	40
	Clay, light-olive-gray, slightly calcareous---	18	58
	Till, olive-gray, silty-----	18	76
	Sand, medium to coarse, moderately well-sorted, subangular to subrounded-----	4	80

151-55-11ccc--Continued

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift--Continued:			
	Till, olive-gray, silty to sandy-----	13	93
	Sand, medium to coarse, moderately well- sorted, subangular to subrounded-----	3	96
	Till, olive-gray, silty to sandy-----	7	103
	Sand, very fine, clayey to silty-----	17	120
	Till, olive-gray, silty-----	70	190
Carlisle Formation:			
	Clay, olive-black, silty, noncalcareous-----	10	200

151-55-12ddd2
(Log furnished by Fredericksons' Inc; Fargo)
City of Larimore Test Hole

Clay-----	10	10
Sand, dirty, fine-----	32	42
Sand, fine-----	10	52
Sand, dirty-----	4	56
Clay-----	23	89

151-55-13aaa

Glacial Drift:			
	Soil, brownish-black, sandy-----	1	1
	Sand, poor samples-----	4	5
	Sand, medium, poorly to moderately poorly sorted, angular to rounded, oxidized-----	5	10
	Sand, medium, poorly to moderately poorly sorted, angular to rounded, unoxidized---	10	20
	Sand, medium, moderately well-sorted, angular to subrounded-----	16	36
	Sand, medium to coarse, moderately poorly sorted, subangular; shale fragments predominate-----	14	50
	Silt, olive-gray to dark-greenish-gray, sandy-----	13	63

151-55-18aaa

Glacial drift:			
	Soil, dusky-yellowish-brown, clayey-----	1	1
	Till, dusky-yellow, silty, oxidized-----	10	11
	Till, olive-gray, silty, unoxidized-----	17	28
	Till, olive-gray, clayey-----	47	75
	Till, olive-gray, silty-----	9	84

151-55-18aaa--Continued

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Niobrara Formation--Continued:			
	Clay, olive-black, friable, very calcareous-	21	105

151-55-24ccc

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Soil, brownish-black, silty-----	1	1
	Silt, mottled pale-yellowish-brown and moderate-yellowish-brown, clayey, slightly calcareous, oxidized-----	8	9
	Sand, very fine to fine, angular to subangular, unoxidized; shale fragments predominate-----	21	30
	Sand, very fine to fine, subangular to subrounded, quartzose-----	9	39
	Clay, olive-gray, slightly calcareous-----	14	53

151-55-36aaa

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Soil, brownish-black, silty-----	1	1
	Silt, pale-yellowish-brown, clayey, oxidized-----	9	10
	Silt, olive-gray, clayey, unoxidized-----	2	12
	Sand, fine, angular to subangular, quartzose	8	20
	Sand, very fine to fine, angular to subangular, quartzose-----	11	31
	Clay, olive-gray, moderately calcareous-----	22	53

152-50-29dda

<u>Geologic source</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>	
Glacial drift:	Soil, black, clayey to silty-----	1	1	
	Silt, yellowish-gray, very clayey; thin, light-gray silt laminae; oxidized-----	14	15	
	Clay, yellowish-gray, oxidized-----	2	17	
	Clay, olive-gray, slightly calcareous, unoxidized-----	20	37	
	Clay, olive-black, noncalcareous-----	7	44	
	Clay, olive-gray, slightly calcareous; scattered, light-gray, calcareous specks----	36	80	
	Till, olive-gray, very clayey; few rock fragments present-----	57	137	
	Clay, dark-greenish-gray, slightly calcareous--	28	165	
	Clay, olive-black, noncalcareous-----	11	176	
	Till, olive-black, sandy to silty, very calcareous-----	19	195	
	Till, olive-black, very clayey-----	4	199	
	Gravel, fine to coarse, poorly sorted, sandy; clay and silt laminae present-----	15	214	
	Till, dark-yellowish-brown, sandy to very gravelly, very calcareous-----	69	283	
	Winnipeg Group:	Clay, pale-reddish-brown to dusky-red silty; interbedded, thin, very-light-gray limestone	10	293
		Sandstone, dark-reddish-brown, medium, well-sorted, well rounded; calcium carbonate and iron oxide cement-----	2	295

152-50-33bad
(Log furnished by Porter Bros.)

Silt-----	20	20
Clay-----	111	131
Till-----	64	195
Sand-----	2	197
Clay-----	12	209
Sand-----	8	217
Clay-----	1	218
Sand-----	2	220
Shale-----	37	257
Sand-----	35	292
Shale-----	2	294

152-51-14ccc2
(Log furnished by the Agricultural Research Service)

Glacial drift:	Silt, moderate-yellowish-brown, mottled light-gray to buff, clayey, oxidized-----	12	12
	Clay, olive-gray slightly silty, noncalcareous, unoxidized-----	17	29
	Clay, olive-gray, silty, noncalcareous-----	13	42

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift--Continued	Clay, olive-gray, slightly silty, noncalcareous-	32	74
	Till, olive-gray, very silty to clayey, slightly calcareous-----	11	85
	Till, olive-gray, silty to sandy, non- calcareous-----	16	101
	Till, olive-gray, sandy, slightly calcareous----	11	112
Dakota Group:	Sand, light-brownish-gray, coarse, well-sorted, well-rounded, quartzose-----	10	122
	Sand, light-brownish-gray, medium to coarse, well-rounded, quartzose-----	5	127
	Sand, light-brownish-gray, fine to medium, well-rounded, quartzose-----	8	135
	Sand, light-brownish-gray, coarse, well-sorted, well-rounded, quartzose-----	12	147
	Shale, dark-olive-gray to olive-black, slightly calcareous-----	15	162

152-51-15ddd

(Log furnished by the Agricultural Research Service)

Glacial drift:	Soil, grayish-black, silty-----	2	2
	Silt, yellowish-gray, clayey, noncalcareous, oxidized-----	4	6
	Silt, olive-gray, clayey, noncalcareous, unoxidized-----	4	10
	Clay, olive-gray, slightly silty, slightly calcareous-----	30	40
	Clay, olive-gray, moderately silty, noncalcareous-----	35	75
	Till, olive-gray, very clayey-----	18	93
	Till, olive-gray, sandy; driller reports sand from 100 to 103-----	18	111
Dakota Group:	Sand, very fine to fine, subrounded to rounded, quartzose-----	15	126
	Sand, fine, well-sorted, subrounded to rounded, quartzose-----	24	150
	Sand, very fine to fine, subrounded to rounded, quartzose-----	17	167
	Sand, very fine, subangular to subrounded, quartzose-----	9	176
	Clay, medium-dark-gray, slightly calcareous-----	10	186

152-51-36ddd

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Clay, yellowish-gray to moderately yellowish-brown, silty, noncalcareous, oxidized-----	14	14
	Clay, olive-gray; light-gray, very calcareous silt laminae; unoxidized-----	16	30
	Clay, olive-gray, slightly calcareous-----	39	69
	Till, olive-gray, silty, very calcareous-----	83	152
	Till, olive-gray, silty to sandy-----	6	158
	Till, olive-gray, silty-----	25	183
	Sand, olive-gray, medium to coarse, silty to gravelly-----	17	200
	Till, olive-gray; poor samples-----	51	251
Winnipeg Group:	Clay, pale-reddish-brown to moderate-reddish-brown, silty, very calcareous-----	5	256
	Poor samples-----	1	257

152-52-9aaa

Glacial drift:	Soil, brownish-black, silty-----	1	1
	Clay, moderate-yellowish-brown to yellowish-gray, silty, oxidized-----	12	13
	Clay, olive-gray, silty, slightly calcareous, unoxidized-----	21	34
	Till, dark-greenish-gray to olive-gray, silty; numerous interstratified sand strata between 48 and 60 feet-----	32	66
	Till, dark-yellowish-brown, silty to gravelly--	33	99
	Silt, olive-gray, clayey, very calcareous-----	5	104
	Till, olive-gray, gravelly, very calcareous----	30	134
Dakota Group:	Sand, coarse, moderately well-sorted, angular to rounded-----	78	212
	Shale, olive-gray, very slightly to non-calcareous, lignitic-----	6	218
	Clay, mottled light-bluish-gray and moderate-red, noncalcareous-----	20	238
	Silt, light-brownish-gray, very sandy, non-calcareous; sand may be interbedded with silt-----	37	275
	Clay, very pale-orange, very calcareous-----	18	293
Red River Formation:	Limestone, white, microcrystalline-----	1	294

152-52-12bba

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Soil, brownish-black, silty-----	1	1
	Silt, dusky-yellow, clayey, slightly calcareous, oxidized-----	8	9
	Clay, dusky-yellow, slightly silty, oxidized---	2	11
	Clay, olive-gray, noncalcareous, silty; silt decreases with depth, unoxidized-----	29	40
	Till, olive-gray, sandy to silty-----	15	55
	Till, olive-gray, very silty-----	8	63

152-52-20bbb

Glacial drift:	Soil, brownish-black, sandy-----	2	2
	Sand, fine to medium, well-sorted, sub- angular to subrounded, quartzose-----	2	4
	Clay, dusky-yellow to yellowish-gray, silty, very calcareous, oxidized-----	6	10
	Clay, light-olive-gray, slightly calcareous---	25	35
	Till, olive-gray, silty-----	18	53
	Silt, olive-gray, clayey, very calcareous-----	14	67
	Sand, fine, well-sorted, angular to subangular, quartzose-----	7	74

152-52-26dcd

Glacial drift:	Soil, dusky-brown, silty-----	2	2
	Silt, dusky-yellow, clayey, slightly calcareous, oxidized-----	11	13
	Clay, light-olive-gray, unoxidized-----	12	25
	Till, olive-gray, silty, very calcareous-----	5	30
	Sand, greenish-black, very fine to fine, angular to subangular, quartzose, silty, very calcareous-----	7	37
	Sand, fine to medium, well-sorted, subangular to subrounded, quartzose-----	8	45
	Till, olive-gray, very calcareous, silty-----	41	86
	Sand, fine to medium, well-sorted, subangular to subrounded-----	17	103
	Sand, medium to coarse, well-sorted, sub- angular to subrounded; interstratified olive-gray, silty, clay-----	5	108
	Limestone boulder-----	2	110
Dakota Group:	Sand, yellowish-gray, very fine; inter- stratified olive-gray, silty clay-----	16	126

152-52-28aad

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)	
Glacial drift:	Soil, black, clayey-----	1	1	
	Clay, yellowish-gray, silty, oxidized-----	11	12	
	Clay, olive-gray, slightly calcareous, unoxidized-----	13	25	
	Till, olive-gray, silty-----	5	30	
	Sand, mottled light-olive-gray, coarse, well- sorted, subrounded to rounded, quartzose---	12	42	
	Clay, light-olive-gray, slightly silty-----	1	43	
	Sand, mottled light-olive-gray, fine to coarse, subrounded to rounded, quartzose---	14	57	
	Sand, mottled gray, coarse to very coarse, subrounded to rounded, quartzose-----	19	76	
	Gravel, fine to coarse, poorly sorted, subrounded to rounded-----	32	108	
	Till, olive-gray, silty, very calcareous-----	28	136	
	Dakota Group:	Clay, brownish-gray to brownish-black, noncalcareous, medium-gray silt laminae near top-----	38	174
		Sand, pale-yellowish-brown, medium, well- sorted, quartzose-----	15	189

152-52-32aaa

Glacial drift:	Soil, brownish-black, silty-----	1	1
	Silt, dusky-yellow, clayey, oxidized-----	9	10
	Clay, light-olive-gray, slightly calcareous, unoxidized-----	4	14
	Till, olive-gray, silty-----	14	28
	Sand, very fine to fine, well-sorted, angular to subrounded, quartzose-----	11	39
	Silt, olive-gray, clayey-----	12	51
	Sand, very fine to fine, well-sorted, angular to subrounded, quartzose-----	23	74

152-52-33ddd

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Soil, brownish-black, silty-----	1	1
	Clay, dusky-yellow, slightly silty, oxidized--	8	9
	Till, olive-gray, sandy, unoxidized-----	15	24
	Sand, fine to medium, well-sorted, subangular to subrounded, quartzose-----	12	36
	Silt, olive-gray, clayey; interstratified, fine to medium, quartzose sand-----	10	46
	Till, olive-gray, silty; interstratified fine to medium, well-sorted, quartzose, gravel-----	11	57
	Till, olive-gray, silty to sandy-----	58	115

152-53-27aaa

Glacial drift:			
	Soil, black, silty-----	1	1
	Till, moderate-yellowish-brown, silty, oxidized-----	14	15
	Till, olive-gray to dark-greenish-gray, very silty, unoxidized-----	36	51
	Clay, olive-gray, silty-----	6	57
	Gravel, fine to coarse, very poorly sorted, angular to rounded-----	3	60
	Till, olive-gray to dark-greenish-gray, very silty; driller reports gravel from 81 to 83 and 94 to 99-----	45	105

152-53-36bab

(Log furnished by U.S. Air Force)

	Clay-----	15	15
	Gravel (dry)-----	2	17
	Till (clay & stone)-----	43	60
	Clay (gummy, lacustrine)-----	10	70
	Sand, fine at top (also silty) and becoming progressively coarser downward to gravel at base. Many shale pebbles-----	25	95
	Till, with much gravel-----	15	110

152-54-29ccc

Glacial drift:			
	Sand, very fine to fine, moderately poor sorted, angular to rounded, oxidized-----	3	3
	Silt, moderate-yellowish-brown to dark-yellow- ish-brown, clayey to sandy, oxidized-----	7	10
	Sand, very fine to medium, poorly sorted, angular to rounded, oxidized-----	3	13
	Till, olive-gray, silty to sandy, unoxidized---	18	31

152-54-31bbb

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Soil, black, sandy-----	1	1
	Sand, very fine to fine, moderately well- sorted, angular to rounded; interstratified clay; poor samples-----	4	5
	Silt, grayish-orange, clayey to sandy-----	7	12
	Sand, medium, moderately well-sorted, angular to rounded, oxidized-----	2	14
	Sand, medium, moderately well-sorted, angular to rounded, unoxidized-----	60	74
	Gravel, fine to coarse, poorly sorted, angular to rounded, sandy-----	2	76
	Till, dark-greenish-gray to olive-gray, silty--	8	84

152-54-33baa

Glacial drift:			
	Soil, brownish-black, sandy-----	1	1
	Sand, very fine to coarse, poorly sorted, angular to rounded, oxidized-----	4	5
	Sand, medium to coarse, poorly sorted, angular to rounded, gravelly, oxidized-----	4	9
	Sand, very fine to fine, moderately poor sorted, angular to rounded, oxidized-----	5	14
	Silt, olive-gray to dark-greenish-gray, clayey to sandy, unoxidized-----	6	20
	Till, olive-gray to dark-greenish-gray, unoxidized-----	22	42

152-54-36acc

Glacial drift:			
	Soil, brownish-gray, silty-----	1	1
	Silt, yellowish-brown, clayey, plastic, oxidized-----	2	3
	Sand, coarse to very coarse, poorly sorted, angular to subrounded, quartzose, gravelly--	4	7
	Gravel, fine to medium, poorly sorted, subrounded, sandy-----	6	13
	Silt, pale-yellowish-brown to dark-yellowish- brown, clayey, oxidized-----	7	20
	Till, olive-gray, silty, unoxidized-----	38	58
	Till, olive-gray, clayey to silty-----	42	100

152-55-9cdd

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Soil, black, sandy-----	1	1
	Clay, dusky-yellow, slightly silty, non- calcareous, oxidized-----	4	5
	Sand, fine to medium, well-sorted, subangular to subrounded, oxidized-----	20	25
	Sand, fine to medium, well-sorted, subangular to subrounded, unoxidized-----	23	48
	Clay, light-olive-gray, slightly calcareous---	5	53
	Till, olive-gray, silty to sandy, very calcareous-----	55	108
Carlike Formation:	Shale, grayish-black, hard, noncalcareous, silty-----	18	126

152-55-13aab

Glacial drift:	Soil, brownish-black, clayey-----	1	1
	Till, moderate-yellowish-brown, clayey to silty, oxidized-----	8	9
	Till, dark-greenish-gray, very sandy-----	11	20
	Till, olive-gray, very silty-----	12	32

152-55-13ccc

Glacial drift:	Soil, brownish-black, sandy-----	1	1
	Sand, fine, subangular to subrounded, quartzose, oxidized-----	8	9
	Clay, pale-yellowish-brown, oxidized-----	5	14
	Sand, fine, subrounded to rounded, oxidized; shale fragments predominate-----	5	19
	Sand, very fine to fine, subangular to sub- rounded, quartzose, oxidized-----	9	28
	Sand, very fine to fine, subangular to sub- rounded, quartzose, unoxidized-----	3	31
	Sand, fine to medium, subangular to sub- rounded, quartzose-----	7	38
	Sand, medium to very coarse, angular to sub- angular, quartzose, gravelly-----	13	51
	Sand, fine to medium, subangular to sub- rounded; shale fragments predominate-----	19	70
	Silt, dark-gray, moderately calcareous, clayey-	14	84

152-55-14bbb

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Soil, brownish-black, sandy-----	1	1
	Sand, dark-yellowish-brown, medium, poor to moderately sorted, quartzose, silty-----	9	10
	Sand, mottled moderate-brown, coarse, moderately sorted, subangular, oxidized-----	10	20
	Sand, mottled medium-gray, fine to very coarse, subangular to subrounded, unoxidized-----	22	42
	Sand, mottled medium-gray, fine to medium, subrounded-----	6	48
	Sand, mottled medium-gray, fine to very coarse, subrounded; shale fragments predominate-----	4	52
	Sand, mottled medium-gray, coarse, well-sorted, subrounded; shale fragments predominate-----	10	62
	Silt, dark-greenish-gray, slightly calcareous--	22	84

152-55-14ccd

Glacial drift:	Roadfill-----	2	2
	Sand, very fine, subangular quartzose, silty, oxidized-----	8	10
	Sand, fine, subangular to subrounded, quartzose, oxidized-----	10	20
	Sand, very fine to fine, angular to subangular, quartzose, oxidized-----	4	24
	Sand, very fine to fine, angular to subangular, quartzose, unoxidized-----	7	31
	Till, olive-gray, cohesive, silty, moderately calcareous-----	4	35
	Sand, very coarse to coarse, subangular to subrounded, gravelly-----	4	39
	Till, olive-gray, cohesive, silty, moderately calcareous-----	2	41
	Gravel, fine to medium, subangular, sandy; predominantly shale fragments-----	13	54
	Silt, olive-gray, cohesive, clayey, moderately calcareous-----	4	58
	Till, dark-greenish-gray to olive-gray, very cohesive-----	5	63

152-55-20baa

<u>Geologic source</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Glacial drift:	Soil, brownish-black, silty-----	2	2
	Silt, dark-yellowish-brown, clayey, laminated, oxidized-----	7	9
	Sand, dark-yellowish-brown, very fine to fine, well sorted, silty, oxidized-----	3	12
	Till, moderate-yellowish-brown, very clayey, oxidized-----	10	22
	Till, olive-gray, clayey to silty, unoxidized-	10	32

152-55-24ccd

Glacial drift:	Roadfill-----	2	2
	Sand, very fine, subangular, quartzose, silty, oxidized-----	8	10
	Sand, fine, subangular to subrounded, quartzose, oxidized-----	10	20
	Sand, very fine, angular to subangular, quartzose, oxidized-----	4	24
	Sand, very fine, angular to subangular, quartzose, unoxidized-----	7	31
	Till, olive-gray, silty-----	4	35
	Sand, very coarse to coarse, subangular to subrounded, gravelly-----	4	39
	Till, olive-gray, silty-----	2	41
	Gravel, fine to medium, subangular, sandy; shale fragments predominate-----	13	54
	Silt, olive-gray, moderately calcareous, clayey	4	58
	Till, dark-greenish-gray to olive-gray-----	5	63

152-55-27abb

Glacial drift:	Soil, brownish-black, silty-----	1	1
	Silt, pale-yellowish-brown to dark-yellowish- brown, sandy, oxidized-----	5	6
	Sand, fine to medium, subangular to subrounded, oxidized-----	14	20
	Sand, fine to medium, subangular to subrounded, unoxidized-----	11	31
	Silt, olive-gray, sandy-----	11	42

152-55-27ddd

Glacial drift:	Soil, black, silty-----	1	1
	Silt, moderate-yellowish-brown to dark-yellowish- brown, oxidized-----	14	15
	Sand, coarse, moderately poorly sorted, angular to subrounded; shale fragments predominate; unoxidized-----	19	34
	Silt, olive-gray to dark-greenish-gray, sandy---	29	63

153-50-3lccc

<u>Geologic source</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Glacial drift:	Roadfill-----	4	4
	Silt, moderate-yellowish-brown, clayey, oxidized-----	4	8
	Clay, moderate-yellowish-brown, silty, oxidized-----	6	14
	Clay, olive-gray, slightly calcareous-----	78	92
	Till, olive-gray, clayey-----	42	134
	Till, olive-gray, silty to sandy-----	27	161
	Till, dark-yellowish-brown to brownish-gray, silty to sandy-----	19	180
	Sand, medium-light-gray, fine to very coarse, silty, lignitic-----	6	186
	Silt, pale-brown to dark-reddish-brown-----	4	190
	Till, dark-yellowish-brown, sandy to bouldery, very calcareous-----	8	198
	Gravel, fine to coarse, poorly sorted, sub- angular; driller reports interstratified till-----	9	207
	Till, dark-yellowish-brown, sandy to gravelly, very calcareous-----	18	225
	Till, olive-gray, very bouldery-----	27	252
	Winnipeg Group:	Clay, very-pale-orange, very calcareous-----	1	253
	Poor samples-----	1	254

153-51-10ddc

Glacial drift:	Soil, black, silty-----	2	2
	Silt, yellowish-gray, clayey; light-brown clay laminae; oxidized-----	8	10
	Clay, yellowish-gray, oxidized-----	7	17
	Clay, olive-gray; light-gray, calcareous specks; unoxidized-----	72	89
	Till, olive-gray, very clayey-----	6	95
Dakota Group:	Sand, light-gray to medium-light-gray, fine, well-sorted, quartzose-----	20	115
	Silt, olive-gray-----	5	120
	Sand, light-gray to medium-light-gray, medium to coarse, subrounded to rounded; lignitic near base-----	30	150
Red River Formation (?):	Poor samples-----	1	151

153-51-25aaa

Glacial drift:	Soil, brownish-black, clayey-----	1	1
	Clay, moderate-yellowish-brown to dark-yellow- ish-brown, silty noncalcareous, oxidized---	18	19
	Clay, olive-gray, slightly silty; medium-gray silt laminae; unoxidized; becomes less silty with depth-----	76	95

153-51-25aaa--Continued

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift--Continued:			
	Till, olive-gray, silty to slightly sandy, very calcareous-----	25	120
	Clay, olive-gray-----	16	136
	Till, olive-gray-----	27	163
	Till, pale-brown to pale-reddish-brown, very sandy, very calcareous-----	3	166
	Silt, moderate-reddish-brown-----	4	170
	Till, moderate-yellowish-brown to pale-red- dish-brown, very sandy; very bouldery from 170 to 181-----	21	191
	Till, olive-gray, sandy, very calcareous----	4	195
	Gravel, medium to coarse, angular to sub- angular; predominately limestone-----	8	203
Red River Formation:			
	Limestone, bluish-white to pinkish-gray, microcrystalline; bluish-white, very calcareous clay-----	5	208

153-52-18ddd

Glacial drift:			
	Soil, black, silty-----	2	2
	Silt, moderate-yellowish-brown to pale-olive- gray, clayey, noncalcareous, oxidized----	14	16
	Silt, olive-gray, clayey, unoxidized-----	50	66
	Till, olive-gray to dark-greenish-gray, silty	39	105
	Gravel, fine to coarse, poorly sorted, angular to subrounded-----	8	113
	Till, olive-gray, silty to gravelly, very calcareous-----	9	122
	Till, olive-gray, very silty to sandy; sand below 126 feet flowed 24 gallons per minute-----	4	126

153-52-32cbc

Glacial drift:			
	Soil, brownish-black, clayey-----	3	3
	Clay, yellowish-gray, silty, oxidized-----	7	10
	Sand, fine to medium, moderately sorted, sub- angular to subrounded, quartzose, oxidized-	6	16
	Clay, light-olive-gray, slightly calcareous, unoxidized-----	15	31
	Till, light-olive-gray, silty-----	40	71
	Sand, fine to medium, moderately sorted, sub- angular to subrounded, quartzose-----	10	81
	Clay, olive-gray, very silty-----	18	99
	Sand, fine to medium, well-sorted, subangular to subrounded, quartzose-----	7	106
	Till, olive-gray, very silty; interstratified fine to medium, poorly sorted sand; well flowed 20 gallons per minute from sand at 116 feet-----	10	116

153-53-9ccc

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)	
Glacial drift:	Soil, black, silty-----	1	1	
	Clay, pale-olive-gray to moderate-yellowish-brown, oxidized-----	11	12	
	Till, olive-gray to dark-greenish-gray, very silty to sandy, unoxidized-----	59	71	
	Sand, poorly sorted, angular to rounded, gravelly-----	2	73	
	Till, olive-gray to dark-greenish-gray, silty	7	80	
	Gravel, fine, angular to rounded, sandy-----	2	82	
	Till, olive-gray, silty-----	51	133	
	Gravel, poorly sorted, angular to rounded, sandy-----	2	135	
	Till, olive-gray, silty-----	11	146	
	Till, olive-gray, sandy to very sandy-----	78	224	
	Dakota Group:	Silt, brownish-gray, sandy, noncalcareous, laminae of gray, calcareous silt-----	28	252

153-53-29aab

Glacial drift:	Soil, brownish-black, silty-----	1	1
	Till, dusky-yellow to yellowish-gray, silty, very calcareous, oxidized-----	11	12
	Till, olive-gray, clayey, unoxidized-----	10	22
	Sand, fine to medium, poorly sorted, gravelly-	2	24
	Till, olive-gray, silty-----	4	28
	Till, olive-gray, clayey-----	42	70
	Sand, medium to coarse, poorly sorted, sub-angular to subrounded, gravelly-----	4	74
	Till, light-gray, sandy-----	5	79
	Till, olive-gray, silty-----	61	150
	Belle Fourche Formation:	Clay, olive-black, silty, noncalcareous-----	18	168

153-54-27ccd

Glacial drift:	Sand, very poorly sorted, angular to rounded, gravelly, oxidized-----	3	3	
	Till, grayish-orange, silty to sandy, oxidized	3	6	
	Till, olive-gray to dark-greenish-gray, silty-	55	61	
	Sand, coarse to very coarse, poorly sorted, angular to rounded, gravelly-----	2	63	
	Till, olive-gray, silty-----	65	128	
	Sand, medium to coarse, poorly sorted, angular to rounded-----	2	130	
	Till, olive-gray, silty-----	18	148	
	Gravel, fine to medium, poorly sorted, angular to rounded, sandy-----	2	150	
	Till, olive-gray, silty to sandy; numerous gravel deposits-----	14	164	
	Till, olive-gray, silty-----	87	241	
	Belle Fourche Formation:	Shale, olive-gray; light-gray, calcareous silt laminae-----	21	262

153-55-2cdd

<u>Geologic source</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Glacial drift:	Soil, dark-brownish-black, sandy-----	1	1
	Sand, medium to very coarse, poorly sorted, angular to subrounded, gravelly, oxidized---	8	9
	Till, olive-gray to dark-greenish-gray, very silty, unoxidized-----	23	32

153-55-4ccd

Glacial drift:	Soil, brownish-black, silty-----	1	1
	Silt, grayish-orange, sandy, oxidized-----	2	3
	Sand, coarse, moderately sorted, angular to rounded, oxidized-----	12	15
	Sand, coarse, moderately sorted, angular to rounded, unoxidized-----	29	44
	Silt, olive-gray, clayey-----	6	50
	Till, olive-gray; poor samples-----	12	62

153-55-5ccc

Glacial drift:	Soil, brownish-black, silty-----	1	1
	Silt; poor samples-----	2	3
	Sand, coarse, poorly sorted, angular to sub- rounded, oxidized-----	6	9
	Sand, coarse, poorly sorted, angular to sub- rounded, unoxidized-----	30	39
	Till, olive-gray to dark-greenish-gray-----	14	53

153-55-9add

Glacial drift:	Soil, brownish-black, sandy-----	1	1
	Sand, fine to coarse, poorly sorted, sub- angular to subrounded, quartzose, gravelly--	4	5
	Sand, medium to coarse, moderately sorted, quartzose, oxidized; sand becomes finer near base-----	9	14
	Silt, medium-gray to dark-gray, clayey, unoxidized-----	3	17

153-55-9add--Continued

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift--Continued:			
	Sand, fine to medium, well-sorted, sub- rounded to rounded, quartzose, unoxidized---	16	33
	Sand, fine to medium, moderately sorted, angular to subrounded, quartzose; very clayey from 51 to 53-----	20	53
	Silt, olive-gray, very clayey, moderately cohesive; scattered light-gray silt laminae-----	33	86
	Till, olive-gray, clayey-----	6	92
	Till, brownish-gray, silty to sandy-----	10	102
	Till, olive-gray, clayey to silty-----	78	180
	Till, olive-gray, silty to sandy-----	17	197
	Till, olive-gray, clayey-----	21	218
	Till, olive-gray, silty to sandy, slightly calcareous-----	17	235
	Till, olive-gray, clayey, cohesive-----	14	249
Greenhorn(?) Formation:			
	Shale, olive-black, noncalcareous; scattered medium-gray, noncalcareous, silt laminae----	11	260

153-55-16ccc

Glacial drift:			
	Soil, grayish-black, sandy-----	1	1
	Sand, grayish-orange, medium, well-sorted, subangular to subrounded, oxidized-----	17	18
	Sand, olive-gray, medium to coarse, mod- erately well-sorted, subangular to subrounded, unoxidized-----	11	29
	Clay, light-olive-gray, slightly silty, noncalcareous-----	9	38
	Till, olive-gray, sandy-----	21	59
	Sand, coarse, poorly sorted, subangular to subrounded, silty-----	6	65
	Till, olive-gray, clayey-----	54	119
	Till, olive-gray, sandy-----	32	151
	Sand, medium to coarse, poorly sorted, sub- angular to subrounded, gravelly-----	5	156
	Till, olive-gray, sandy-----	6	162
	Sand, medium to coarse, moderately well-sorted, subangular to subrounded; minor amounts of silt and clay-----	28	190
Carlisle Formation:			
	Shale, olive-black, moderately fissile, non- calcareous; difficult drilling between 210 and 214-----	30	220

153-55-24bbb

<u>Geologic source</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Glacial drift:	Soil, dark-brown, sandy-----	1	1
	Sand, dusky-brown, fine to medium, well-sorted, subrounded, quartzose, oxidized-----	9	10
	Till, olive-gray, clayey, very calcareous, unoxidized-----	71	81
	Sand, medium to coarse, poorly sorted-----	1	82
	Till, olive-gray, clayey-----	153	235
	Sand, medium to coarse, moderately well- sorted, subangular to subrounded, quartzose-----	9	244
	Till, olive-gray, sandy to gravelly-----	45	289
	Till, olive-gray, clayey-----	9	298
Greenhorn Formation:	Clay, olive-gray, silty, very calcareous; light-gray silt laminae-----	17	315

153-55-32aaa

Glacial drift:	Soil, brownish-black, silty-----	1	1
	Silt, yellowish-brown, clayey-----	2	3
	Sand, very coarse, poorly sorted, angular to rounded, gravelly, oxidized-----	7	10
	Sand, coarse, poorly sorted, angular to sub- rounded, oxidized-----	12	22
	Till, olive-gray to dark-greenish-gray, silty--	28	50
	Gravel, poorly sorted, angular to rounded-----	3	53
	Silt, olive-gray to dark-greenish-gray, sandy--	6	59
	Till, olive-gray to dark-greenish-gray, silty; boulders from 124 to 126-----	96	155
	Sand, very coarse, poorly sorted, angular to subrounded, gravelly-----	2	157
	Till, olive-gray, very silty-----	19	166
Carlisle Formation:	Shale, olive-gray, hard; light-gray silt laminae; noncalcareous-----	23	189

153-55-33acd

Glacial drift:	Soil, brownish-black, sandy-----	1	1
	Sand, medium to coarse, moderately well- sorted, subangular to subrounded, oxidized; very gravelly from 12 to 17-----	17	18
	Sand, medium to coarse, moderately sorted, subangular, unoxidized-----	15	33
	Clay, light-olive-gray, very silty-----	7	40

153-55-33add

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Soil, brownish-black, sandy-----	1	1
	Sand, medium to coarse, moderately well- sorted, subangular-----	37	38
	Clay, olive-gray, very silty-----	8	46
	Silt, olive-gray, clayey, slightly cohesive-----	21	67
	Till, olive-gray, clayey-----	13	80

153-55-33ddd

Glacial drift:	Soil, brownish-black, sandy-----	1	1
	Sand, very fine to fine, subrounded, quartzose, oxidized-----	21	22
	Sand, fine to medium, subangular to sub- rounded, oxidized-----	3	25
	Sand, fine, subrounded to subangular, oxidized-----	10	35
	Sand, fine to medium, subangular to sub- rounded, quartzose-----	5	40
	Sand, medium to coarse, subangular to sub- rounded, quartzose, gravelly-----	4	44
	Gravel, fine to medium, subangular-----	13	57
	Sand, very fine to fine, angular to sub- angular, silty-----	14	71
	Silt, olive-gray-----	5	76
	Till, olive-gray, moderately calcareous-----	8	84

153-55-34ccc1

Kyllo Obs. Well No. 1

Glacial drift:	Soil, black, very silty-----	1	1
	Clay, moderate-yellowish-brown, silty to sandy, very calcareous, poorly to mod- erately cohesive-----	5	6
	Sand, medium to coarse, moderately well- sorted, subangular, oxidized-----	24	30
	Sand, fine to medium, moderately well- sorted, angular to subangular, unoxidized---	25	55
	Clay, olive-gray, moderately cohesive, silty; scattered sand grains and pebbles-----	5	60

153-55-34ccc2
Kyllo Obs. Well No. 2

<u>Geologic source</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Glacial drift:	Soil, black, clayey-----	1	1
	Clay, moderately yellowish-brown, moderately cohesive, silty-----	9	10
	Sand, fine to medium, moderately well-sorted, angular to subangular, oxidized-----	20	30
	Sand, medium to coarse, moderately well- sorted, angular to subangular, unoxidized---	30	60
	Sand, medium to coarse, poorly sorted, sub- angular, gravelly-----	2	62
	Clay, olive-gray, moderately calcareous, silty to gravelly-----	8	70

153-55-34ccc3
Kyllo Obs. Well No. 3

Glacial drift:	Soil, black, clayey-----	1	1
	Clay, moderate-yellowish-brown, poorly to moderately cohesive, silty-----	4	5
	Sand, fine to medium, moderately well-sorted, subangular to subrounded, oxidized-----	25	30
	Sand, fine to medium, moderately well-sorted, subangular to subrounded, unoxidized-----	5	35
	Sand, medium to coarse, moderately well- sorted, subangular-----	10	45
	Clay, medium-dark-gray, moderately cohesive, silty, contains some large sand grains and pebbles-----	15	60

153-55-34ccc4
Kyllo Obs. Well No. 4
(Driller's log)

Glacial drift:	Topsoil, black, silty-----	1	1
	Clay, yellowish-brown, silty-----	6	7
	Sand, fine, medium to coarse-----	58	65
	Clay, olive-gray, sandy, silty-----	10	75

153-55-34ccc5
Kyllo Production Well

Glacial drift:	Silt, clayey-----	5	5
	Sand, fine to medium, moderately well-sorted, gravelly, oxidized; some limonitic stain---	18	23
	Sand, fine to medium, moderately well-sorted, clayey; scattered silt laminae-----	2	25
	Sand, fine to coarse, moderately sorted; scattered silt and clay laminae-----	28	53
	Sand, fine to coarse, poorly sorted, gravelly; scattered clay laminae-----	7	60
	Till(?), olive-gray, clayey-----	2	62

153-55-34ccc6
Kyllo Pilot Test Hole

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Soil, black, clayey-----	1	1
	Clay, moderate-yellowish-brown, poorly to moderately cohesive, silty, oxidized-----	4	5
	Sand, medium to coarse, moderately well-sorted, subangular, oxidized-----	27	32
	Sand, medium to coarse, moderately well-sorted, subangular, unoxidized-----	21	53
	Gravel, medium to coarse, poorly to moderately sorted, subangular, sandy-----	3	56
	Sand, medium to coarse, poorly sorted, angular to subangular, gravelly-----	4	60
	Clay, medium-dark-gray, moderately cohesive, very calcareous-----	10	70

153-55-34ccd
Kyllo Obs. Well No. 5

Glacial drift:	Soil, black, clayey-----	1	1
	Clay, moderate-yellowish-brown, very silty, poorly to moderately cohesive-----	4	5
	Sand, fine to medium, moderately well-sorted, subangular to subrounded, oxidized-----	25	30
	Sand, fine to medium, moderately well-sorted, subangular, unoxidized-----	11	41
	Sand, fine to coarse, poorly sorted, subangular-----	9	50
	Clay, dark-gray, silty, moderately cohesive; few coarse sand grains and pebbles-----	10	60

153-55-35bbb

Glacial drift:	Sand, medium, moderately well-sorted, oxidized--	15	15
	Sand, fine to medium, moderately poorly sorted, angular to subangular; clayey between 29 and 35-----	20	35
	Sand, fine, moderately poor sorted, clayey, unoxidized-----	5	40
	Silt, olive-gray to dark-greenish-gray, unoxidized-----	23	63

153-55-36aaa

Glacial drift:	Soil, brownish-black, sandy-----	1	1
	Sand, coarse, poorly sorted, quartzose, oxidized-----	2	3
	Till, moderate-yellowish-brown, sandy, unoxidized-----	1	4
	Till, olive-gray to dark-greenish-gray, unoxidized-----	1	5
	Sand, poorly sorted, gravelly; poor samples-----	3	8
	Till, olive-gray, silty-----	24	32

154-51-19ccc

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Soil, black, clayey-----	2	2
	Clay, dark-yellowish-orange to light-olive-gray, oxidized-----	15	17
	Clay, olive-gray, unoxidized-----	52	69
	Till, olive-gray to dark-greenish-gray, very silty, very calcareous-----	48	117
Dakota Group:	Sand, medium to coarse, moderately poor sorted, subrounded to rounded, quartzose; brownish-gray, noncalcareous clay laminae-----	43	160
	Clay, olive-gray, silty, slightly calcareous---	10	170
	Silt, light-bluish-gray to greenish-gray, noncalcareous; numerous sand laminae between 205 and 219-----	49	219
	Silt, yellowish-gray, clayey, noncalcareous---	31	250
	Sandstone, coarse, well-sorted, quartzose, hard, pyrite cement-----	2	252
	Clay, light-brownish-gray, sandy-----	11	263

154-52-7bbb

Glacial drift:	Soil, brownish-black, clayey-----	1	1
	Clay, yellowish-gray to dusky-yellow, silty, slightly calcareous, oxidized-----	14	15
	Clay, light-olive-gray, noncalcareous, silty, unoxidized-----	8	23
	Clay, light-olive-gray-----	65	88
	Till, olive-gray, clayey-----	12	100
	Silt, olive-gray, clayey, very calcareous-----	5	105
	Till, olive-gray, sandy-----	39	144
Dakota Group:	Clay, olive-black, silty, noncalcareous; light-gray silt laminae-----	2	146
	Sand, fine to medium, very well-sorted, rounded to well-rounded, quartzose-----	5	151

154-53-21bbb

Glacial drift:	Soil, brownish-black, clayey-----	1	1
	Till, grayish-orange to light-olive-gray, slightly calcareous, oxidized-----	17	18
	Till, olive-gray to dark-greenish-gray, clayey--	58	76
	Gravel, medium to coarse, poorly sorted, angular to rounded, sandy-----	2	78
	Till, olive-gray, clayey-----	2	80
	Gravel, medium to coarse, poorly sorted-----	1	81
	Till, olive-gray, clayey to sandy-----	84	165
Dakota Group:	Shale, olive-gray, silty; light-gray sand laminae; numerous light-brown calcite prisms-	13	178
	Shale, olive-gray, silty, hard-----	11	189

154-54-1aaa

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Soil, brown, sandy-----	1	1
	Sand, dusky-yellow, fine to medium, subangular to subrounded, poorly sorted, clayey to gravelly, oxidized-----	10	11
	Clay, light-olive-gray, slightly calcareous, unoxidized-----	20	31
	Till, light-olive-gray, clayey-----	14	45
	Sand, medium to coarse, poorly sorted, subangular to subrounded, gravelly-----	2	47
	Till, olive-gray, clayey-----	9	56
	Till, olive-gray, clayey; numerous thin, coarse sand and gravel strata-----	104	160
	Till, light-olive-gray, silty to sandy-----	6	166
	Till, olive-gray, clayey-----	45	211
Dakota Group:	Clay, olive-black, silty, slightly calcareous; light-gray silt laminae; scattered calcite prisms-----	10	221
	Clay, olive-black to light-gray, very silty, noncalcareous, hard-----	10	231

154-54-18cdc

Glacial drift:	Soil, brownish-black, sandy-----	1	1
	Gravel, fine to coarse, very poorly sorted, angular to rounded, sandy, unoxidized-----	2	3
	Till, moderate-yellowish-gray, gravelly-----	2	5
	Till, olive-gray to dark-greenish-gray, very silty-----	12	17
	Sand, moderately well sorted, subangular to subrounded; poor samples-----	17	34
	Gravel, very poorly sorted, sandy-----	11	45
	Till, olive-gray to dark-greenish-gray, silty--	81	126
	Hole abandoned		

154-54-26bbb

Glacial drift:	Soil, brownish-black, silty-----	1	1
	Till, dusky-yellow, clayey, very calcareous, oxidized-----	10	11
	Till, olive-gray, clayey, unoxidized-----	15	26
	Sand, medium to coarse, moderate sorting, subangular to subrounded, gravelly-----	3	29
	Till, olive-gray; poor samples-----	49	78
	Till, olive-gray, clayey-----	52	130
	Gravel, fine to coarse, poorly sorted, sandy---	6	136
	Till, olive-gray, clayey-----	35	171
	Till, olive-gray, silty to sandy-----	38	209

154-54-26bb--Continued

<u>Geologic source</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Belle Fourche Formation--Continued:	Clay, olive-black, very silty, noncalcareous; light-gray silt laminae-----	22	231

154-55-11bbb

Glacial drift:	Soil, brownish-black, sandy-----	1	1
	Sand, light-olive-gray, medium to coarse, well- sorted, subangular to subrounded, quartzose-	25	26
	Till, olive-gray, clayey to silty-----	15	41
	Till, olive-gray, clayey, very calcareous----	23	64
	Clay, olive-gray, silty, very calcareous-----	4	68
	Till, olive-gray, clayey to silty-----	69	137
	Sand, coarse, very poorly sorted, subangular, silty to gravelly-----	9	146
	Till, olive-gray, clayey-----	25	171
	Sand, fine to coarse, poorly sorted, subangular to subrounded, gravelly-----	3	174
	Till, olive-gray, clayey to sandy-----	37	211
	Sand, medium to coarse, poorly sorted, sub- angular to subrounded, gravelly-----	28	239
	Till, olive-gray, clayey-----	20	259
	Till, olive-gray, sandy to gravelly-----	43	302
Greenhorn Formation:	Shale, very light-gray, silty, bentonic, very calcareous-----	13	315

154-55-14ccc

Glacial drift:	Soil, dark-brown, sandy-----	1	1
	Sand, medium-brown, medium to coarse, moderate to well-sorted, subangular to rounded, oxidized-----	4	5
	Sand, mottled-brown, medium, poor to moderately sorted, subangular to rounded, oxidized----	10	15
	Sand, mottled-brown, fine to medium, poorly sorted, subangular to subrounded, oxidized--	10	25
	Sand, mottled brown to gray, medium to coarse, subangular to subrounded, unoxidized-----	38	63
	Sand, gray, fine to medium, subrounded to rounded, quartzose-----	10	73
	Till, olive-gray, clayey-----	21	94

154-55-14cdd
Groth observation well 3

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Sand, fine to coarse, poorly sorted, sub- subrounded, quartzose, oxidized-----	9	9
	Sand, medium to coarse, moderately sorted, subrounded to rounded, quartzose, oxidized-	4	13
	Sand, medium to coarse, moderately sorted, subrounded to rounded, quartzose, gravelly, unoxidized-----	7	20
	Sand, fine to medium, moderately sorted, sub- rounded, quartzose-----	20	40
	Sand, fine, well-sorted, subrounded to rounded, quartzose-----	16	56
	Till; poor samples-----	7	63

154-55-14dcc
Groth observation well 4

Glacial drift:			
	Sand, very fine to fine, moderately sorted, subangular to subrounded, quartzose, oxidized-----	13	13
	Sand, fine to medium, well-sorted, subangular to subrounded, quartzose, unoxidized-----	7	20
	Sand, fine, well-sorted, subangular to sub- rounded; numerous shale and limestone fragments-----	12	32
	Sand, fine to coarse, poorly sorted, sub- angular to subrounded, quartzose-----	8	40
	Sand, fine to medium, moderately sorted, sub- angular to subrounded, quartzose-----	30	70
	Sand, fine, well-sorted, subrounded, quartzose	4	74
	Silt, medium-dark-gray to olive-gray-----	10	84

154-55-15ccc

Glacial drift:			
	Soil, brownish-black, sandy-----	1	1
	Gravel, fine to coarse, very poorly sorted, angular to rounded, sandy, oxidized-----	9	10
	Sand, very coarse, poorly rounded, angular to rounded, gravelly, unoxidized-----	14	24
	Till, olive-gray to dark-greenish-gray, very silty-----	18	42

154-55-15dcc

<u>Geologic source</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Glacial drift:			
	Sand, very coarse, subangular to subrounded, gravelly-----	4	4
	Silt, pale-yellowish-brown to moderate- yellowish-brown, slightly calcareous-----	4	8
	Sand, coarse to very coarse, quartzose, gravelly, oxidized-----	9	17
	Sand, coarse to very coarse, quartzose, gravelly, unoxidized-----	4	21
	Sand, fine to medium, subrounded to rounded, quartzose-----	18	39
	Gravel, fine to medium, subrounded, sandy-----	3	42
	Sand, medium, well-sorted, subangular, quartzose-----	2	44
	Sand, fine, well-sorted, subangular to sub- rounded, quartzose-----	20	64
	Till, olive-gray, clayey-----	15	79
	Silt, olive-gray-----	5	84

154-55-17ccc

Glacial drift:			
	Soil, brownish-black, silty-----	1	1
	Silt, moderate-yellowish-brown to pale-olive- gray-----	2	3
	Sand, fine to medium, moderate poorly sorted, angular to rounded, oxidized-----	17	20
	Sand, fine to medium, moderate poorly sorted, angular to rounded; sand becomes more coarse with depth; unoxidized-----	20	40
	Sand, medium to coarse, very poorly sorted, gravelly-----	13	53
	Silt, olive-gray to dark-greenish-gray-----	21	74

154-55-18ccc

Glacial drift:			
	Soil, brownish-black, sandy-----	1	1
	Sand, medium to coarse, moderate poorly sorted, angular to subrounded, oxidized-----	24	25
	Sand, medium to coarse, moderate poorly sorted, angular to subrounded, unoxidized-----	5	30
	Sand, coarse, poorly sorted, subangular to subrounded, gravelly-----	3	33
	Till, olive-gray to dark-greenish-gray, silty-	9	42

154-55-23aaa

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Soil, brownish-black, sandy-----	1	1
	Sand, fine to medium, moderately sorted, sub- rounded to rounded, quartzose-----	8	9
	Sand, fine, well-sorted, subangular to sub- rounded, quartzose, oxidized-----	6	15
	Sand, fine, well-sorted, subangular to sub- rounded, quartzose, unoxidized-----	14	29
	Till, olive-gray, silty to sandy-----	13	42

154-55-23baa2

Groth observation well 1

Glacial drift:			
	Soil, brownish-black, sandy-----	1	1
	Sand, fine to coarse, very poorly sorted, subangular to subrounded, quartzose-----	4	5
	Sand, medium to coarse, poorly sorted, sub- angular, quartzose, oxidized-----	10	15
	Sand, medium, well-sorted, subangular, well rounded, quartzose, unoxidized-----	5	20
	Sand, fine to medium, moderately sorted, sub- angular to rounded-----	5	25
	Sand, medium, well-sorted, subangular, quartzose; shale fragments increase with depth-----	32	57
	Till, olive-gray; poor samples-----	6	63

154-55-23baa3

Groth observation well 2

Glacial drift:			
	Soil, brownish-gray, sandy-----	1	1
	Sand, fine to medium, moderately well-sorted, subrounded to rounded, oxidized; shale fragments predominate-----	6	7
	Sand, fine to coarse, poorly sorted, subangular to subrounded, quartzose; minor amounts of shale gravel; oxidized-----	11	18
	Sand, fine to coarse, poorly sorted, subangular to subrounded, quartzose, unoxidized-----	5	23
	Sand, coarse, moderate poorly sorted, sub- rounded to subangular, gravelly-----	7	30
	Sand, medium to coarse, moderately sorted, subangular to subrounded, quartzose-----	26	56
	Sand, fine to medium, moderately sorted, sub- angular to subrounded, quartzose-----	7	63
	Sand, medium, poorly sorted, subangular to subrounded, quartzose-----	5	68
	Till, olive-gray, clayey-----	6	74

154-55-23baa4
Groth observation well 6

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Soil, brownish-black, sandy-----	1	1
	Sand, dusky-brown, fine to medium, well-sorted, subangular to subrounded, quartzose-----	10	11
	Sand, dusky-yellow, medium, moderately well- sorted, subangular to subrounded, quartzose, gravelly, oxidized-----	10	21
	Sand, olive-gray, medium to coarse, well-sorted, subangular to subrounded, quartzose, unoxidized-----	35	56
	Sand, coarse, moderately sorted, subangular to subrounded, gravelly-----	7	63
	Till, olive-gray, silty-----	11	74

154-55-23bab
Groth observation well 5

Glacial drift:	Silt, moderate-brown, clayey, very calcareous--	3	3
	Sand, fine to very coarse, poorly sorted, sub- angular to subrounded, oxidized-----	11	14
	Sand, fine to very coarse, poorly sorted, sub- angular to subrounded, unoxidized-----	3	17
	Sand, medium to very coarse, poorly sorted, subangular to subrounded, gravelly-----	16	33
	Sand, fine to medium, moderately sorted, sub- rounded, quartzose-----	34	67
	Till, olive-gray; poor samples-----	6	73

154-55-24dbb
(Log furnished by Great Northern RR)

Black top soil-----	5	5
Brown clay-----	2	7
Fine sand (water bearing)-----	19	26
Soft blue clay-----	2	28
Dry sand and gravel-----	4	32
Soft gray clay-----	7	39
Coarse sand and clay-----	16	55
Black rock-----	8	63
Dry sand-----	5	68
Clay and sand-----	96	164
Clay and gravel-----	7	171
Dry gravel-----	4	175
Sand and clay-----	113	288
Blue clay--soft-----	7	295
Blue shale (water bearing)-----	102	397

154-55-26bbb

<u>Geologic source</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Glacial drift:	Soil, brownish-black, sandy-----	1	1
	Sand, very fine to fine, angular to sub- rounded, quartzose, oxidized-----	10	11
	Silt, moderate-yellowish-brown, calcareous----	2	13
	Sand, fine to medium, moderately sorted, sub- angular to subrounded, quartzose, oxidized	2	15
	Silt, olive-gray, calcareous-----	2	17
	Sand, fine to medium, moderately sorted, sub- angular to subrounded, quartzose-----	23	40
	Sand, fine to coarse, poorly sorted, angular to subrounded, quartzose-----	8	48
	Sand, medium, well-sorted, angular to sub- angular, quartzose-----	18	66
	Till, olive-gray, sandy-----	3	69
	Sand, medium to coarse, moderately sorted, angular, quartzose-----	8	77
	Till, olive-gray; poor samples-----	7	84

154-55-27dcd

Glacial drift:	Soil, brownish-black, sandy-----	1	1
	Sand, fine to medium, moderately sorted, sub- angular, quartzose, oxidized-----	16	17
	Sand, very fine to fine, moderately sorted, subangular to subrounded, quartzose, oxidized-----	10	27
	Sand, very fine to fine, moderately sorted, subangular to subrounded, quartzose, unoxidized-----	8	35
	Till, olive-gray, silty-----	18	53

154-55-29ecc

Glacial drift:	Roadfill-----	3	3
	Sand, fine to coarse, poorly sorted, sub- angular to subrounded, quartzose, oxidized-	9	12
	Sand, fine to coarse, poorly sorted, sub- angular to subrounded, quartzose, unoxidized-----	3	15
	Sand, very fine to fine, moderately sorted, subangular to subrounded, quartzose-----	5	20
	Sand, fine to medium, moderately sorted, sub- angular to subrounded, quartzose-----	8	28
	Sand, very fine to fine, moderately sorted, subangular to subrounded, quartzose-----	13	41
	Till, olive-gray-----	2	43
	Sand, medium to coarse, poorly sorted, sub- angular, quartzose, gravelly-----	8	51

154-55-29ccc--Continued

<u>Geologic source</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift--Continued:			
	Clay; from Driller's Log--no samples-----	5	56
	Sand, fine to medium, moderately sorted, angular to subrounded, quartzose-----	6	62
	Till, olive-gray; poor samples-----	12	74

154-56-1dbb

Glacial drift:			
	Soil, brownish-black, sandy-----	1	1
	Sand, dusky-yellow, fine, well-sorted, sub- angular to subrounded, silty-----	4	5
	Sand, light-olive-gray, coarse to very coarse, moderately sorted, subangular to sub- rounded, quartzose-----	6	11
	Sand, medium to very coarse, well-sorted, sub- angular to subrounded, gravelly-----	36	47
	Silt, olive-gray, very clayey, very calcareous	15	62
	Till, olive-gray, clayey; interstratified sand and gravel between 81 and 100 feet-----	127	189
	Sand, olive-gray, coarse, moderately sorted, subangular to subrounded, gravelly-----	13	202
	Till, olive-gray, clayey-----	38	240
Carlisle Formation:			
	Shale, olive-black, silty; light-gray silt laminations; noncalcareous-----	23	263

154-56-23baa

Glacial drift:			
	Soil, brownish-black, sandy-----	1	1
	Sand, medium to very coarse, poorly sorted, angular to rounded, gravelly, oxidized-----	3	4
	Till, moderate-yellowish-brown, silty, oxidized-----	3	7
	Till, olive-gray to dark-greenish-gray, silty, unoxidized-----	10	17
	Gravel, fine to medium, poorly sorted, angular to rounded-----	3	20
	Till, olive-gray, silty; numerous boulders----	75	95
Carlisle Formation:			
	Shale, olive-black, hard; light-gray silt to sand laminae; calcareous-----	31	126

TABLE 4.—Chemical analyses of selected water samples

Source: Kd, Dakota Group of Cretaceous age; Kp, Pierre Formation of Cretaceous age; Pz, Paleozoic undifferentiated; Qd, glacial drift of Quaternary age; Qev, Elk Valley delta deposits of Quaternary age; Qla, Lake Agassiz deposits of Quaternary age. [Analytical results in parts per million except as indicated]

Remarks: Analyses by North Dakota State Laboratory Department unless otherwise noted; (a) analysis by North Dakota State Department of Health; (b) analysis by U.S. Geological Survey.

Location	Depth	Source	Date of collection	Temperature (°F)	Silica (SiO ₂)	Total iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Carbonate (CO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B)	Dissolved solids			Specific conductance (micro-mhos at 25°C)	pH	Remarks					
																		Sum	Residue on evaporation at 100°C	Hardness as CaCO ₃ Calcium magnesium								
149-49-20bn	21	Qla	9-1-66	54	19	1.2	96	19	5.9	14	297	0	17	6.8	0.1	1	0.32	267	268	217	7	5	.2	438	7.8			
149-50-31bc	170	Kd	7-31-61	...	0.60	342	298	1,022	25	360	48	1,271	94	8.0	1.2	2.9	3,336	....	600	...	...	...	...	...	5,842	7.6	
149-50-33bb	200	Kd	12-1-6120	254	86	900	..	281	0	1,050	1,150	...	33	...	3,754	900	5,770	7.6	
149-51-3bbb2	185	Kd	10-12-66	48	26	1.9	232	83	1,210	35	200	0	1,400	1,420	1.7	1.4	2.2	4,510	4,490	920	757	73	17	...	6,740	7.9		
149-51-4cbb	140	Qd(?)	10-12-66	50	19	26	200	102	793	15	393	0	397	1,330	..1	30	.78	3,100	3,250	920	600	64	11	...	5,010	7.6		
149-51-7ada	160	Kd	10-11-66	50	25	5.2	298	92	1,050	28	282	0	1,290	1,330	1.0	21	1.9	4,280	4,370	1,120	890	66	14	...	...	7.1	
149-51-24cd	140	Kd	8-12-65	58	18	3.8	302	128	776	12	300	0	2,030	1,884	4	2.2	1.9	3,900	3,920	1,280	1,040	57	9.5	...	4,940	7.4		
149-51-25cd	415	Kd	7-31-61	...	1.2	217	415	1,292	42	258	0	2,152	1,488	8.0	6.1	2.9	7,470	....	920	...	...	...	...	...	6,067	7.5	
149-52-5dce	42	Qla	8-17-65	..	18	4.2	181	55	10	9.2	410	0	395	2.6	..0	..8	..00	838	901	1,376	382	3	..2	...	3,150	7.8		
149-52-13cb	100	Qd	10-12-66	..	21	7.1	398	128	479	21	251	0	1,070	921	..2	20	..1	3,190	3,390	1,520	1,320	40	5.4	...	4,670	7.5		
149-52-21cd	230	Kd	10-12-66	48	1.1	20	298	116	1,360	52	19	0	1,560	1,860	1.8	22	1.9	5,300	4,650	1,220	1,210	17	..	...	8,060	6.5	
149-52-22cd	20	Qla	8-12-65	..	17	..12	221	62	32	114	584	0	1,560	100	..0	253	..15	1,390	1,490	808	329	7	..5	...	1,990	7.2		
149-53-15dce	24	Qev	8-12-65	47	24	1.5	203	56	54	7.1	344	0	450	80	..6	..4	..30	1,050	1,090	735	453	14	..9	...	1,460	8.0		
149-53-28cc	198	Qd	6-7-69	..	23	..62	43	8	218	14	434	0	92	155	..5	..7	1.6	770	709	140	0	70	8.0	...	1,410	8.2		
149-53-33ab	186	Qd	6-8-69	..	23	..39	39	12	199	13	384	0	31	169	..5	..8	1.6	677	650	146	0	73	7.2	...	1,140	8.2		
149-54-4ccc	40	Qev	8-24-65	..	19	..08	152	56	20	360	0	332	8.0	..2	1.5	..00	766	764	610	315	7	..4	...	1,090	7.8			
149-54-9dcd1	154	Qd	7-15-65	..	17	..04	246	74	33	7.7	360	0	570	76	..2	..2	..00	200	1,280	920	626	..	..	...	1,650	7.7	
149-54-9dcd1	52	Qev	7-15-65	58	18	..10	221	73	54	9.0	410	0	525	72	..4	3.1	..20	1,180	1,250	850	515	12	..8	...	1,620	7.7		
149-54-9dcd2	53	Qev	7-15-65	..	18	..10	70	16	244	11	426	0	248	151	..2	..9	1.3	980	930	264	0	66	6.5	...	1,520	7.8		
149-55-7aba	27.4	Qd	8-12-65	51	17	..72	96	36	11	5	396	0	84	6.2	..2	1.1	..30	453	434	388	64	6	..2	...	740	7.7		
150-50-23aaa1	200	Qd	8-13-65	50	14	..06	336	124	29	20	307	0	300	4.76	..1	51	..20	1,600	1,990	1,350	935	4	..3	...	2,660	7.6		
150-50-28aa	275	Qd	9-21-66	50	24	..52	328	112	1,190	24	191	0	584	1,960	..8	1.9	..2	4,720	4,840	1,280	1,120	66	15	...	7,670	7.8		
150-50-32cb	400	Kd(?)	10-12-66	50	20	4.6	352	119	1,58	25	307	0	285	206	..2	547	..00	1,670	1,750	870	659	27	2.3	...	2,400	7.6		
150-51-8abb	170	Kd(?)	10-12-66	48	25	3.7	326	104	1,160	27	325	0	1,410	1,460	1.2	26	1.9	4,700	4,910	1,240	974	66	14	...	7,070	7.8		
150-51-18aa	140	Kd	10-12-66	46	24	4.9	328	127	1,110	33	345	0	1,210	1,620	1.2	9.6	2.2	4,600	4,690	1,340	1,060	64	13	...	7,190	7.7		
150-51-26abc	332	Pz	10-12-66	52	23	3.4	222	70	1,220	34	228	0	1,570	1,220	2.2	0	2.7	4,480	4,600	840	654	75	18	...	6,900	8.0		
150-51-31bab	12	Qd	7-15-65	55	16	..08	296	173	102	543	952	0	630	478	..2	352	..42	1,450	671	4,100	4,280	94	1.2	...	4,280	7.6		
150-51-33ccc	180	Kd	10-12-66	50	6.6	..22	230	77	1,070	39	239	0	1,480	1,210	2.8	..7	2.5	4,180	4,280	890	696	71	16	...	6,210	8.0		
150-51-34aaa	120	Qd	8-26-65	..	18	2.4	316	120	1,200	29	285	0	1,480	1,680	..4	0	2.8	5,020	4,740	1,280	1,100	69	16	...	6,970	7.3		
150-51-36aaa	146	Qd	8-17-65	48	18	1.9	270	111	1,200	27	256	0	970	1,860	1.0	4.5	2.5	4,590	4,500	1,130	921	69	15	...	7,100	7.7		
150-52-10abb	165	Qd	10-11-66	49	21	2	304	181	2,120	65	172	0	1,830	3,270	1.8	0	3.0	8,060	8,570	2,000	1,860	69	21	...	12,600	7.9		
150-52-15dce	9.5	Qla	7-15-65	54	16	..20	65	34	6.9	5.8	288	0	58	4.7	..2	26	..36	359	377	302	66	4	..2	...	927	7.7		
150-52-18ccc	12	Qev	9-9-66	56	29	..39	98	26	28	5.4	407	0	33	6	..2	37	..12	463	450	350	17	15	..6	...	727	7.9		
150-52-23ccc	80	Qd	10-11-66	56	21	..06	296	68	943	29	269	0	1,490	1,010	1.0	15	2.1	4,020	3,680	1,090	870	65	12	...	5,780	7.9		
150-52-25dcd	90	Qd	10-11-66	52	25	1.3	250	72	704	26	294	0	1,280	728	1.2	17	1.6	3,020	2,990	845	605	64	11	...	8,440	7.5		
150-50-31aaa	15.7	Qla	10-10-66	52	28	3.4	66	33	12	166	416	0	69	7.2	..4	116	..2	705	661	302	0	5	..3	...	1,010	7.8		
150-53-29aa	19	Qla	9-7-66	56	26	3.0	104	35	15	34	430	34	66	7.4	..2	..2	..18	497	461	405	53	7	..3	...	772	8.4		
150-53-4abb	160	Qd	9-7-66	56	26	5.2	70	23	189	11	401	0	283	53	..1	..2	..06	861	864	270	0	59	..	...	1,300	8.0	
150-53-7aaa	8.8	Qev	9-1-66	57	25	..38	147	40	9.3	8.4	384	0	165	6.3	..4	78	..04	669	693	530	216	4	..2	...	981	7.7		
150-53-11cbb	128	Qd	9-7-66	53	18	3.9	75	27	161	11	342	0	313	48	..1	1.8	..82	828	811	300	20	53	..4	...	1,240	7.9		
150-53-13aaa2	110	Qd	9-9-66	56	2.6	6.1	596	186	2,500	73	197	0	1,860	4,030	2.6	2.8	3.4	9,360	9,760	2,250	2,090	70	23	...	14,200	7.7		
150-54-7cd1	40	Qev	7-15-65	..	16	..08	122	29	3.7	5.0	346	0	129	10	..2	..4	..10	485	537	423	140	2	..1	...	757	7.8		
150-54-7cd2	27	Qev	7-15-65	57	16	..10	230	62	69	5.9	430	0	485	89	..7	11	..08	1,180	1,250	835	483	15	1.0	...	1,650	7.7		
150-54-30aaa	15.6	Qev	7-15-65	48	15	..04	209	113	17	2.0	368	0	690	9.0	1.4	..7	..00	1,230	1,300	965	692	4	..3	...	1,570	7.8		
151-50-5acd	31	Qla	8-17-66	58	24	4.4	378	213	95	8.4	400	0	1,330	101	..2	2.1	..01	2,550	2,740	1,820	1,490	10	1.0	...	2,980	7.7		
151-50-15dce	23	Qla	11-27-6648	637	576	31	6.2	444	0	728	21	..2	..4	..32	1,688	1,213	2,566	7.7	
151-50-10dcd	15.7	Qla	9-6-66	49	7.3	..42	56	15	3.8	5.1	172	0	64	4.1	..1	..9	..11	242	228	203	62	4	..1	...	387	7.7		
151-51-30abb	105	Kd	8-12-65	47	19	1.1	226	82	1,120	34	252	0	1,930	1,170	2.8	2.0	3.1	4,350	4,230	900	694	72	16	...	6,170	7.8		
151-52-6ccc	94	Qd	7-15-69	..	17	1.6	253	70	414	19	466	0	980	368	..2	7	1.1	2,330	2,440	900	588	49	5.9	...	3,250	7.7		
151-52-33aaa	22	Qla	7-15-65	..	15	..04	52	22	414	6.9	488	0	483	172	..4	1.4	..33	1,420	1,350	222	0	80	12	...	2,150	7.8		

[Analytical results in parts per million except as indicated]

Location	Depth	Source	Date of collection	Temp. (°F)	Silica (SiO ₂)	Total iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Borates (B ₂ O ₃)	Carbonates (CO ₃)	Sulfates (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Bromine (Br)	Dissolved solids		Hardness as CaCO ₃		Percent sodium-sulfate ratio	Specific conductance (microhm-cm at 25°C)	pH	Remarks	
																		Sum	Residue on evaporation at 180°C	Calcium magnesium	Non-carbonate					
151-52-3eccd	18.3	Q1a	8-12-65	49	14	0.14	115	37	5.7	6.2	342	0	129	37	0.2	3.5	0.00	517	529	440	160	3	0.1	864	7.7	
151-53-1ccc	90	Qd	9-13-66	54	27	.22	205	79	289	17	264	0	733	368	.3	5.4	0.07	1,850	1,850	835	619	40	4.3	2,700	7.7	
151-53-1dcd	90	Qd	8-12-65	..	12	17	252	81	342	17	368	0	961	305	.0	1.1	1.2	2,170	2,240	960	699	43	4.8	3,040	7.6	
151-53-3bdc	10.4	Q1a	8-12-65	62	19	.10	78	20	6.9	3.5	240	0	66	11	.4	1.6	.10	340	333	276	80	5	.2	558	7.7	
151-54-7ccc1	60	Qev	7-15-65	58	17	.04	91	20	9.5	4.3	299	0	68	11	.4	1.6	.08	370	367	308	63	6	.2	618	7.7	
151-54-7ccc2	60	Qev	7-15-65	58	18	.04	91	16	21	4.9	336	0	63	1.6	.2	.2	.30	382	425	294	19	13	.5	612	7.7	
151-54-23abb	12.9	Qev	8-12-65	50	17	.16	78	24	17	2.2	245	0	94	9.1	.3	74	.26	397	378	293	92	11	.4	628	7.7	
151-54-24bbb	30	Qev	9-21-65	72	33	.01	94	31	8.1	7.8	349	0	48	3.2	.2	59	.16	456	463	360	74	5	.2	689	7.9	
151-55-12dcd1	58	Qev	5-19-64	58	21	.14	90	23	16	4.0	328	0	63	16	.4	4	.00	399	426	318	50	10	.4	658	7.5	
152-50-20acd	18.1	Q1a	8-17-66	58	20	.88	125	90	46	2.8	544	0	253	47	.4	1.8	.47	855	884	683	237	13	.8	1,310	7.9	
152-50-29ada	210	Qd	9-10-65	..	12	0	306	126	1,360	27	204	0	1,350	1,930	.9	50	2.8	5,260	.....	1,280	1,110	69	17	8,360	7.3	
152-50-33acd	294	Flu	9-28-66	..	..	1.6	1,623	764	823	.....	494	0	627	5,644	.....	.....	.....	3,938	.....	2,387	.....	69	15	.....	.....
152-51-1bccc	140(7)	Q1a	9-7-65	48	17	1.7	270	101	1,950	40	278	0	1,459	1,990	2.0	4	3.5	5,560	.....	1,090	860	75	20	8,810	7.8	
152-51-8ccc	11	Q1a	8-17-66	55	8	6.6	51	12	6.5	4.6	139	0	61	8.6	.1	14	.29	241	238	178	64	7	.2	386	7.1	
152-51-15add	174	Qd	9-16-66	47	27	1.4	223	80	1,160	36	222	0	1,930	1,230	2.3	0	3.1	4,400	4,350	885	704	73	17	6,350	7.9	
152-51-34ccc	103	Qd	5-29-56	42	31	.59	208	88	1,100	22	258	0	1,400	1,170	2.6	4	..	4,150	4,380	.....	670	72	..	6,370	7.5	b
152-52-6ccc	73	Qd	8-18-66	48	26	.92	272	95	1,100	28	263	0	1,010	1,980	.5	1.9	2.0	4,260	4,310	1,070	855	69	15	6,710	7.7	
152-52-9aaa	16	Q1a	8-16-66	61	11	1.1	290	158	1,580	25	169	0	1,080	2,670	.4	16	2.3	6,000	6,030	1,530	1,390	69	18	9,650	7.7	
152-54-9ccc	435	Qd	8-19-66	58	5	6.4	150	62	1,260	33	278	0	1,330	1,260	2.1	3.0	2.0	4,250	4,140	628	400	80	22	6,260	8.1	
152-54-10aab	40	Q1a	8-19-66	40	30	.04	74	19	3.4	3.7	273	0	29	2.1	.2	17	.25	313	368	263	40	3	.1	492	8.2	
152-54-14dcd	16	Q1a	7-15-65	..	19	.04	52	29	22	5.7	225	0	103	2.7	.4	6.4	.20	351	412	250	66	16	.6	561	7.7	
152-54-27dcd	60	Qd	8-19-66	60	23	1.4	520	660	227	14	589	0	3,830	21	1.5	65	.29	5,650	5,790	4,010	3,530	11	1.6	5,480	8.0	
152-54-31bbb	60	Qev	8-26-65	52	20	.12	90	31	357	19	350	0	86	11	.3	1.5	.00	431	391	352	65	11	.4	696	8.0	
152-54-36dcd	14	Qev	7-15-65	48	14	.04	119	36	23	6.4	357	0	149	15	.3	.2	.08	554	645	446	129	10	4.7	886	7.7	
152-55-11bbb	18	Qev	8-12-65	50	18	.06	78	33	3.4	2	344	0	44	3.8	.5	5.8	.00	358	337	330	48	2	..	999	7.8	
152-56-2bna	15.5	Kp	8-19-66	..	20	.32	384	173	310	11	414	0	1,310	382	.3	139	.20	2,030	3,090	1,670	1,330	29	3.3	3,810	7.6	
153-51-10dcd	151	Qd	9-7-65	49	14	0	269	85	1,180	24	232	0	1,350	1,370	1.6	5	1.1	4,600	.....	1,080	831	71	16	7,090	7.5	
153-52-18dcd	113	Qd(7)	8-27-65	47	16	.20	290	101	1,650	286	0	1,120	2,350	.6	17	2.4	5,690	4,830	1,140	906	76	21	7,370	7.2		
153-52-30ada	90	Qd	8-27-65	47	20	.26	191	46	1,699	372	0	520	640	.4	0	.95	2,100	2,060	665	360	62	8.4	3,310	7.6		
153-54-21dcd2	33	Q1a	8-19-66	..	26	.04	392	266	110	9.3	359	0	746	557	.3	553	.00	2,840	2,730	2,070	1,770	10	1.1	4,020	7.5	
153-55-4ccc	30	Qev	8-31-65	48	18	.15	107	23	25	6.4	354	0	110	18	.2	0	.18	487	.....	362	64	13	.6	770	8.0	
153-55-32aaa	20	Qev	8-31-65	48	18	2.8	84	20	74	5.6	345	0	1,002	32	.4	.9	.08	510	.....	292	0	35	1.9	868	8.0	
153-55-35acd	30	Qd	8-30-65	53	12	.15	288	87	7.8	4.4	304	0	660	152	.1	14	.15	1,370	.....	1,100	852	2	1	1,910	7.8	
154-51-2dccc	19.4	Q1a	8-18-66	50	20	1.9	105	42	48	6.9	368	0	123	58	.3	41	.07	650	622	433	132	19	1.0	1,000	7.6	
154-51-19ccc	117	Qd	8-18-66	73	20	8.5	670	180	2,530	45	248	0	1,940	4,500	1.0	.6	3.5	9,620	10,200	2,410	2,210	69	22	5,100	7.7	
154-51-36dcd	11.1	Q1a	8-18-66	56	31	1.1	174	49	270	25	564	0	434	229	.2	4.2	.68	1,500	1,470	635	173	47	4.7	2,260	7.8	
154-54-34da	17	Q1a	7-5-65	..	..	.18	..	..	25	..	407	0	132	7	..	0	..	561	536	426	93	11	.5	863	7.7	
154-54-18dcd	40	Qd	9-2-65	49	14	.16	117	31	226	11	286	0	642	23	.2	0	1.2	1,210	.....	420	178	53	4.8	1,710	7.9	
154-55-14ccc	60	Q1a	9-3-65	50	20	0	76	23	22	3.9	268	0	116	3.4	.2	0	.00	396	.....	283	64	14	.6	617	8.0	
154-55-14dccc	74	Q1a	5-26-65	50	28	.24	79	21	6.5	2.8	266	0	71	1.8	.3	.4	.08	342	306	284	66	5	.2	524	8.1	
154-55-17ccc	50	Qev	9-3-65	..	19	0	81	18	44	5.3	291	0	127	7.2	.1	0	.00	445	.....	276	38	25	1.2	696	8.1	
154-55-18ccc	30	Qev	9-2-65	49	17	0	67	17	28	6.2	240	0	110	7.2	.1	0	.09	371	.....	237	41	20	.8	969	8.0	
154-55-23abb	60	Qev	2-2-66	..	..	.21	..	..	14	..	264	0	73	6	..	0	..	336	352	270	54	83	16	517	8.1	
154-55-23aaa3	67	Q1a	5-25-66	50	27	4.4	79	24	6.5	3.1	253	0	94	1.8	.2	.9	.08	365	365	296	88	4	.2	553	8.1	
154-55-23aab	67	Q1a	5-25-66	50	27	.08	77	23	12	3.1	260	0	96	1.8	.2	.7	.08	368	336	287	74	8	.3	560	8.0	
154-56-19cdd	36	Kp	8-19-66	54	24	.06	65	66	222	5.4	517	0	438	22	.6	22	.23	1,120	1,150	433	10	52	4.6	1,620	7.9	

This is one of a series of county reports published cooperatively by the North Dakota Geological Survey and the North Dakota State Water Commission. The reports are in three parts: Part I describes the geology, Part II presents ground water basic data, and Part III describes the ground water resources. Parts I and III will be published later and will be distributed as soon as possible.
