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COUNTY GROUND WATER STUDIES 12

Geology and Ground Water Resources

of

WELLS COUNTY

PART II — GROUND WATER BASIC DATA

by
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Prepared by the United States Geological Survey
in cooperation with the North Dakota State
Water Commission, the North Dakota Geological Survey,
and the Wells County Water Management District.

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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 II and III will be published later and will be distributed as soon as possible.

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

By

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INTRODUCTION

Purpose and Scope

The purposes of the investigation of the geology and ground-water resources of Wells 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 is to 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 Wells County Water Management District. 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 the hydrologic data collected during the county investigation and functions as a reference for Parts I and III.

The information in this report consists of the following: (1) data on about 800 wells, springs, and test holes; (2) water-level measurements in 67 observation wells; (3) logs of about 240 test holes and selected wells; and (4) chemical analyses of 76 water samples.

The data in this report are useful for predicting geologic and ground-water conditions in Wells County. For example, a person considering the construction of a new well can locate the proposed site on plate 1 (in pocket). The characteristics of nearby wells may be determined from tables 1 and 2, and the water-level fluctuations in the area may be determined from table 3. The type of material encountered in nearby wells may be determined from table 4, and the chemical quality of water in adjacent wells may be determined from table 5. However, such extrapolations should be made conservatively because of the irregular distribution of the water-bearing materials.

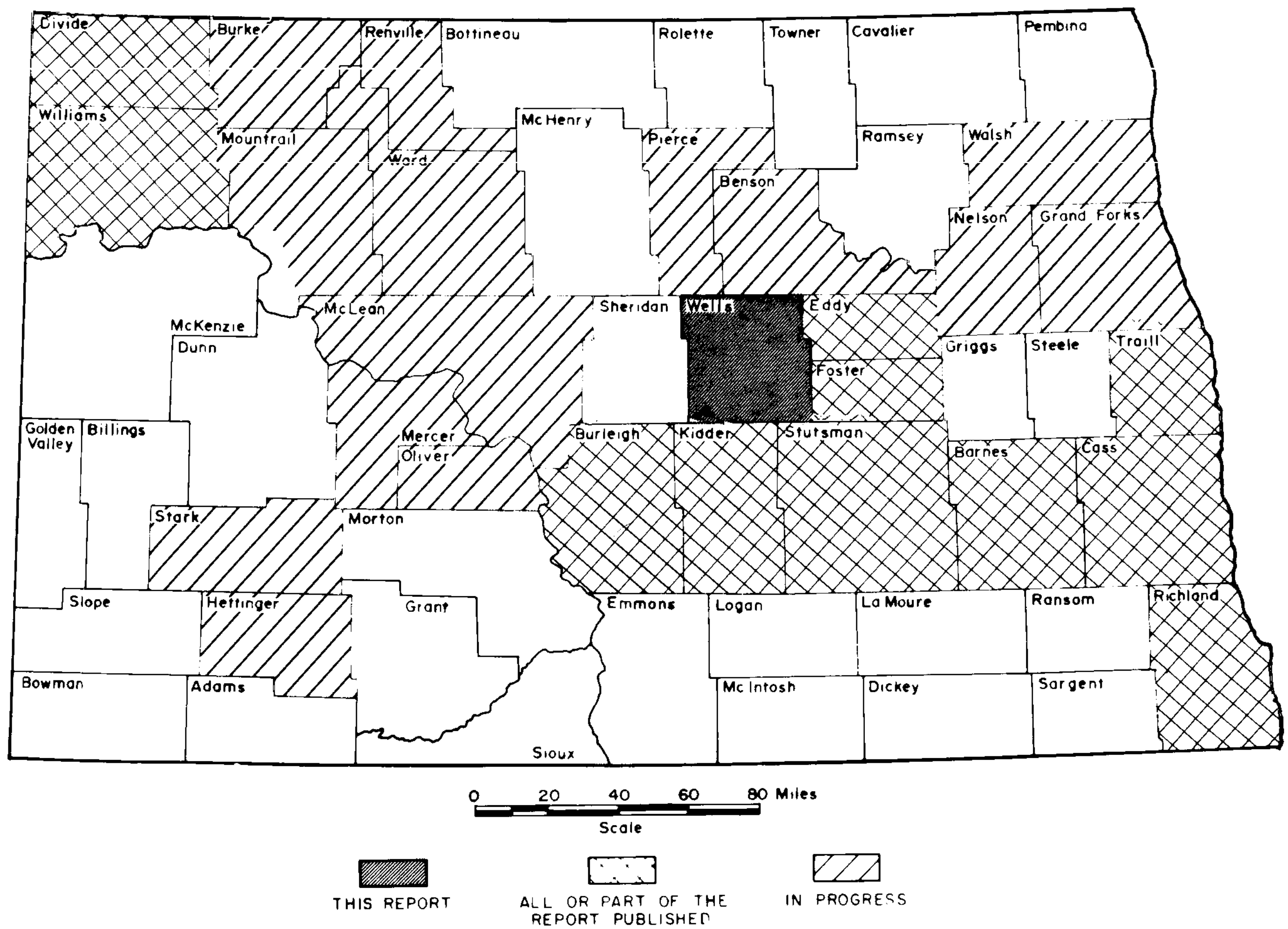

FIGURE 1 - Location of county ground-water studies

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 United States Bureau of Land Management. It is illustrated in figure 2. The first numeral denotes the township north of an east-west base line located in Arkansas, the second numeral denotes the range west of the fifth principal meridian located in Wisconsin, 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 150-72-15aaa is in the NE$\frac{1}{4}$NE$\frac{1}{4}$NE$\frac{1}{4}$ sec. 15, T. 150 N., R. 72 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.

Acknowledgments

The cooperation of the county commissioners, township assessors, and the residents of Wells County is gratefully acknowledged. Well site logs were prepared principally by L. L. Froelich and C. H. Beeks, Jr., of the North Dakota State Water Commission. The early stages of the investigation were under the direction of P. G. Randich of the U.S. Geological Survey.

EXPLANATION OF TABLES

The logs in table 4, except those furnished by commercial drilling companies, are composites of the well-site geologists' and drillers' descriptions, sample analyses, and electric logs (where available). Visual methods (megascopic and microscopic) were used to describe the composition and texture of the subsurface rock samples. Color descriptions were determined by comparing the sample with the Geological Society of America rock-color chart (1963). If the cuttings reacted (effervesced) when treated with dilute hydrochloric acid, the material was described as calcareous. Grain-size determinations used in the logs refer to the Wentworth (1922) size scale. Logs of test holes without test-hole numbers were drilled in the late 1940's and early 1950's for an unpublished report on the Heimdal valley and New Rockford area. Commercial logs are in the terminology of the individual driller with the exception that the order has been changed to present the principal lithology first.

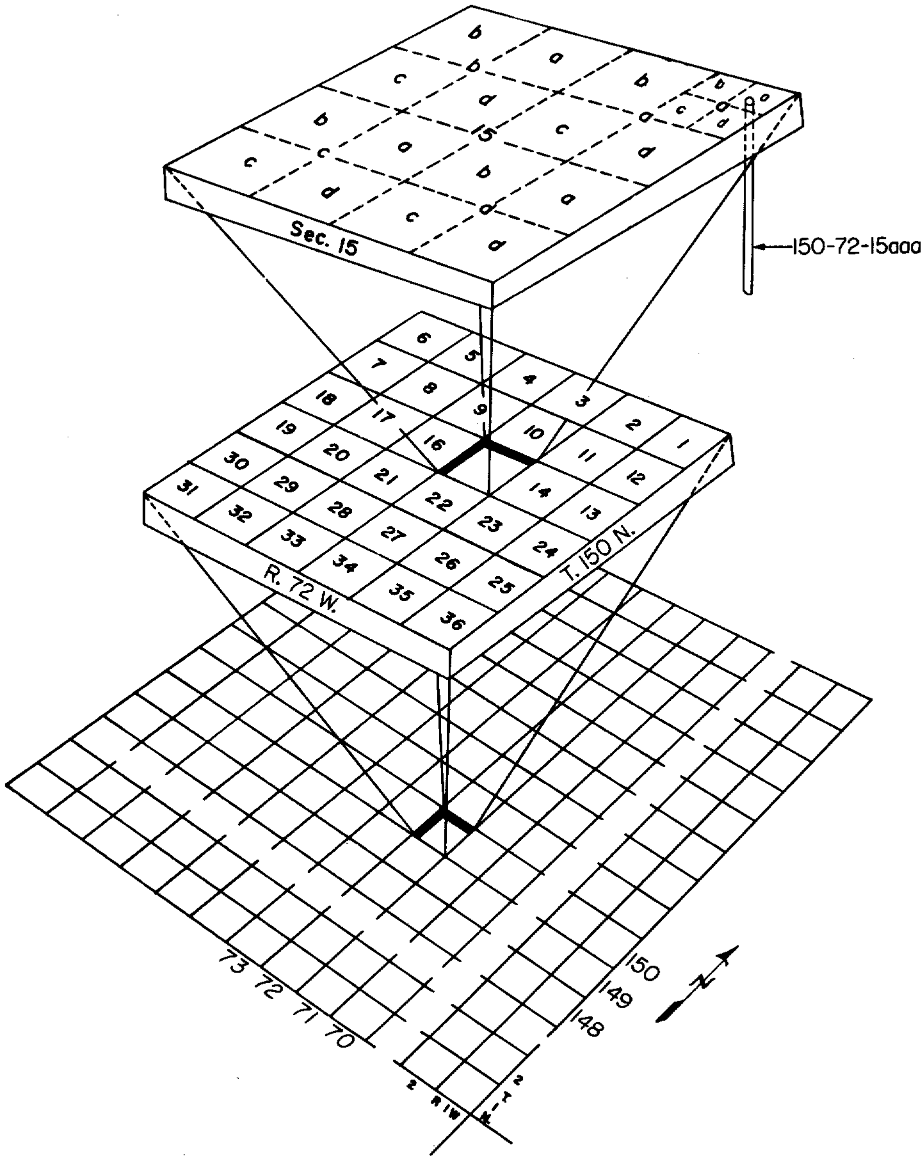

FIGURE 2 – System of numbering wells, springs, and test holes.

Of special note are the terms, "taking water" and "lost circulation." Under normal circumstances a general rule to follow is that any bed of rock materials beneath the earth's zone of saturation that will take water during hydraulic rotary drilling will also give up water to wells. Thus, during well drilling where permeable material is present, the water level in the mud pit will decline because drilling fluid is lost to the formation. If the formation penetrated is highly permeable, as a gravel deposit, circulation of the drilling fluid may be entirely lost to the formation. Lost circulation normally may be restored by adding bentonite or a similar substance to the drilling fluid.

The term "till" indicates an unsorted, unstratified agglomeration of rock particles ranging from clay to boulders. Generally clay is the predominant particle size. If a particle size other than clay is dominant, 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.

Observation wells were constructed in selected test holes. These, for the most part, were cased with 1¼-inch plastic pipe, slotted in the lower 10 or 20 feet or screened in the lower 2 feet. They were pumped from 5 to 8 hours and a water sample was collected for chemical analysis (table 5).

The monthly water-level measurements listed in table 3 were made during this investigation. Records of water-level fluctuations in wells in Wells County prior to this study have been published in U.S. Geological Survey Water-Supply Papers 817, 840, 845, 886, 908, 938, 946, 988, 1018, 1025, 1073, 1098, 1128, 1158, 1167, 1193, 1223, 1267, 1323, 1406, and 1456.

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.

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 does not affect water for domestic purposes but it contributes to the formation of scale in pipes, water heaters, and boilers.

Iron (Fe)

Iron compounds are very common in rocks and they are easily leached by ground water. 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 as much as 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 enamelware 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 may be leached from all rocks, but limestone and dolomite fragments in the glacial drift provide the largest amount of calcium in Wells County. Calcium is a major cause of hardness and forms scale on utensils and on boilers and pipes. The calcium content of ground water may be as high as several hundred parts per million.

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 more than 100 ppm of magnesium. Sea water contains more than 1,000 ppm 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 usually 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 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, and K) associated with it. However, moderate amounts of alkalinity do not adversely affect most uses.

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 reduce 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." Concentrations higher than the stated limits may cause mottled enamel in teeth, endemic cumulative fluorosis, and skeletal effects.

Nitrate (NO_3)

Nitrate in water is considered a final oxidation product of nitrogeneous 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 water containing 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 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 of increase in 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 a resultant decrease in rate of heat transfer, possibility of water heater or boiler failure, and decrease 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 U.S. Geological Survey has adopted the following classification:

Hardness range (calcium carbonate in ppm)	Hardness description
0-60	Soft
61-120	Moderately hard
121-180	Hard
More than 180	Very hard

For public use, water with hardness of 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 the 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. Water varies in respect to sodium hazard from that which can be used for irrigation on almost all soils to that which is 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 water 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.--RECORD OF WELLS AND TEST HOLES

EXPLANATION

Method drilled

B, bored
C, cable tool
D, dug
H, hydraulic rotary
J, jetted
V, driven

Aquifer

1G, sand and gravel
OG, glacial till
K , Cretaceous
K1, Lower Cretaceous
K3, Upper Cretaceous
OO, outwash
PA, Hell Creek Formation
PC, Fox Hills Formation
PD, Pierre Formation
PM, Niobrara Formation
QG, Quaternary, Pleistocene
1S, sand
52, buried channel deposits

Lithology

1, very fine grained
2, fine grained
3, medium grained
4, coarse grained
5, very coarse grained
6, clayey
7, silty
8, sandy
9, gravelly
F, shale
G, gravel
P, clay
R, sand and gravel
S, sand
V, sandstone
Y, shaly or slaty

Depth to water below land surface

F, flows

Use of water

C, commercial
H, domestic
P, public supply
S, stock
U, unused
T, institutional

Lift and power

Lift

B, bucket
C, centrifugal
J, jet
N, none
P, piston
S, submersible
T, turbine

Power

1, hand
3, gasoline engine
5, electric motor
6, windmill
F, gasoline engine through 5 horsepower
S, electric motor through 1 horsepower
T, electric motor > 1 to 5 horsepower
U, electric motor > 5 to 15 horsepower

Specific conductance (micromhos per centimeter at 25°C)

3, 301-500
4, 501-1,000
5, 1,001-2,000
6, 2,001-5,000
7, 5,001-10,000
8, 10,001-20,000

Remarks

(1) Chemical quality of water analyses
C, complete
K, conductance
P, partial available but not given

(2) Yield of well, in gallons per minute
A, 0.1 or less
F, 0.6

(3) Type of log data
D, drillers log
E, electric log
G, geologist log or sample log
J, gamma ray log
S, sonic log
X, electric, radiation, caliper, and fluid-velocity logs

(4) Temperature, in degrees F

(5) Frequency of water-level measurements
M, monthly
N, no measurement
O, original (inventory) measurement only

TABLE 1.RECORD OF WELLS AND TEST HOLES.

LOCATION NUMBER	OWNER OR NAME	DEPTH OF WELL (FEET)	DIAM. OF WELL (INCHES)	METHOD DRILL-ED	DATE DRILL-ED	AQUIFER	LITHO-LOGY	DEPTH TO WATER BE-LOW LAND SURFACE (FEET)	DATE OF MEASURE-MENT	USE OF WATER	LIFT AND POWER	SPECIFIC CONDUCT-ANCE	ELEVATION OF LAND SURFACE	REMARKS (1)	(2)	(3)	(4)	(5)
145N068W01CBC	ALFRED WILLEY	20	48	B	1960			8	9-65	H		4	1600	K			45	O
145N068W02CCC	R.W.CLAPPER	32	30	B				20		H			1625					N
145N068W04AAA	J.W.WATSON	30	36	B				20		H			1630					N
145N068W10BCC	U.S.G.S.	27	1	H	1965	QGOO	9S	11	10-65	U	N	5	1630	C		DG	45	M
145N068W12AAA	WILFERD BERG	26	36	B				22		H			1590					N
145N068W12ADD	U.S.G.S.	26	1	H	1965	QGOO	9S	10	10-65	U	N	4	1590	C		DG	46	M
145N068W13DCB	U.L.BURDICK	62	4	H				30		S								N
145N068W14ADA	JAKE WILL	66	30	B				40		S			1625					N
145N068W14CBC	A.E.MEYER	20	30	B	1914					H	S							N
145N068W14DCC	RALPH HARMON	30						25	9-65	H	P	6		K				O
145N068W16CCC	U.S.G.S.	53		H	1965					U			1668			DG		
145N068W18CCD	ARTHUR UNRUH	22	30	B				2	9-65	H	P 6							O
145N068W19BBA	B.J.WALICSKI	125	4	H				90		H								N
145N068W22DDD	TED GUENTER	130	5	C						H	5	4		K				N
145N068W26DCC	U.S.G.S.	210		H	1961					U			2100			G		
145N069W01ADD	R.I.SCHAACK	65	24	B			G	51	10-64	U	P 1							O
145N069W02ABA	JOHN BAUMBACK	74	24					40		H								N
145N069W02BDB	C.E.KUTZ	15	30	B		QG	8G	4	5-66	H	P 5		1670			D		O
145N069W02CCC	U.S.G.S.	441		H	1966					U			1740			EG		
145N069W08AAA	U.S.G.S.	262		H	1965					U	N		1790			EG		N
145N069W11DDD	D.J.POLRIES	300	4	C				50		S								N
145N069W12BAA	V.C.JOHNSON	90	18	B	1964					H	S 5	5		K				N
145N069W12DDA	NORMAN YOUNG	74	36							H	5	4		K				N
145N069W15DCB	J.F.HEFNER	286	4	C				20										N
145N069W18CCD	C.L.PEDERSON	425	2	C						H	P 5	6		K				N
145N069W19AAA	U.S.G.S.	336		H	1966					U			1860			EG		
145N069W26BBB	U.S.G.S.	270	1	H	1965	QGOG	6G	42	10-64	U	N	5	1811	C		EG	44	M
145N069W36DDD	U.S.G.S.	378		H	1965					U			1811			EG		
145N070W02ABA	GEORGE LEMERT	141	4	C	1961		G	100		H	P S	5	1805	C			53	N
145N070W03ADD	RAY BECHTHOLD	185	3	C		K3		60		H	P 5	6	1800	C			47	N
145N070W04DCD	DAVID GEIER	27	30	B	1950			14		H	P S		1845					N
145N070W05BCC	R.E.SUCKET	20	30	D	1947		S	8	7-65	H	J S		1830					O
145N070W07DCC	JAKE BECK	32	18	B	1957					H	P S		1865					N
145N070W08DCC	R.J.BUCHMILLER	28	36	D	1905		S	10		H	P S	4	1835	C			43	N
145N070W09DCC	U.S.G.S.	441		H	1966					U			1855			EG		
145N070W10CDD	ART LIEBELT	330	4	C	1910					H	P S	6	1845	K				N
145N070W13BBB	CONRAD ERFLE	40	32	B				20		H	C 5		1825					N
145N070W15DCD	EMIL WIDICKER	100	2	C	1959		S	26		H	J S	5	1850	C				N
145N070W16BBB	H.G.TEBELIUS	445	2	C	1939	K3PD	F	60		H	P S	6	1865	C			47	N
145N070W18AAB	CLARANCE SEIBEL	25	36	D	1959			12		H	P S		1835					N
145N070W20BAD	B.SCHAUBERT	25	4	D	1910		S			H	P S							N
145N070W21BBB	CHARLES BRUER	40	22	B	1957			18		H	P 5	6		K				N
145N070W21DAB	ADAM STROH	27	30	B	1963		G			H						D		N
145N070W23BBB	JOAN WEIGAND	18	24	D				6	9-65	U	P 1		1823					M
145N070W30CBB	G.SCHAUBERT	25	24					8	9-64	U								O
145N070W31ABC	RONOLD BERTSCH	32	30					18	7-65	H	J 5	5		K				O
145N070W32CDC	E.C.SUCKUT	50	32	C	1959		G	40		H	P S	5		K				N
145N070W33DAD	ORLAND LIEN	85	4	C	1961			45		H	P S	6		K				N
145N070W34ABC	G.A.BROVER	104	4	C	1963			40		H	S 5	5		K				N
145N071W02ABD	CHANCY GILLHAM	120	4	H	1963	QGOG	2S	15		H	P S	6	1905	K		D	46	N
145N071W03AAD	G.SCHANDER	170	3	C	1950					H	P S	5	1875	K			50	N
145N071W04DAD	O.FUHRMAN	37	30	B	1961			14		H		5	1905	K				N

145N071W07CCB	JOHN HUSS	27	24							H	P	S							N
145N071W13ABB	CARDINAL DRILL.	3500		H	1953	K PM	V			U				1880			EG		
145N071W15ADA	J.E.SUCKUT	20	36	D				12		S	P	S							N
145N071W16CAD	GUST FUHRMAN	130	24	B				100		H	S	5		1930					N
145N071W21CCA	MELVEN HOFF	22	36	D	1950		S	10		H	P	5	7		C			50	N
145N071W24CBC	E.L.MYERS	208	3	J	1964					H	P	S	6		P				N
145N071W25DDD	U.S.G.S.	388		H	1965					U				1866			EG		
145N071W26BBD	D.L.BAUMANN	35	24	D	1940			18	7-65	U	N								O
145N071W27BAA	JIM HOFF	2590	2	H	1965	K1	V	250		H	P	S	7	1900	C			55	N
145N071W28DDC	CLIFFORD HOFF	30	22	B	1963			17		H							D		N
145N071W32BAC	LEON GREEN	75	22	B	1959			49		H	S	S	6		K				N
145N071W33DAA	E.HOFF	70	22	B				30		H	P	S	5		K				N
145N071W34AAC	JIM JOHNSON	28	26	B						H	J	5							N
145N072W02ABB	B.E.HART	380	2	C	1912			30		H			6		K				N
145N072W02BBB	F.C.BUCKWITZ	412	2	C	1928			60		H	P	S	6		K				N
145N072W03AAA	ALVIN MILLER	480	3	C			F	20		H	P	5							N
145N072W04DDD	LUDWIG HANSON	45	48	D	1937			18	5-66	S	P	S	6		K				O
145N072W08DCC	G.P.HOOTS	263	2	C				F	12-65	H	P	5							O
145N072W10AAA	U.S.G.S.	338	1	H	1965	QG	4G	19	1-66	U	N		6	1844	C		EG	45	M
145N072W10CAA	L.HANSON	20	38	B	1958		S	12		H	S	5	5		K				N
145N072W23CBA	R.R.RODACKER	106	16	B	1963		2S	50		S	P	3	5		K		D		N
145N072W26DDA	CARDINAL DRILL.	3700		H	1953	K PM	V			U				1906			EG		
145N072W30CAA	H.J.BRAKEL	376	2	C						H	P	S	5		K				N
145N072W32DDD	CARDINAL DRILL.	3865		H	1953	K PM	V			U				2051			EG		
145N073W03CBB	JAKE LANGE	574	3	C	1927					H	J	5	5		K				N
145N073W10AAC	LOUIS DANIELS	320	4	C	1961			+2		S	P	S							N
145N073W12ADD	A.THORMODSGAARD	11	30	D			G	5	8-64	S	P	6	5		K				O
145N073W14BAD	ORVILLE BRAKEL	350	2	C	1964					H	S	5	5		K				N
145N073W17ADD	ANDY WEISE	24						21	8-64	U	N								O
145N073W24BBC	A.HIRSCHKORN	276	3	C	1960			75		H	P	5							N
145N073W24DDC	U.S.G.S.	315		H	1966					U				2064			EG		
145N073W24DDD	HENRY BRAKEL	16	48	D			G	8	9-64	U	P	1	6	2033	C			43	M
145N073W25CDD	N.WECKERLY	18	32	D				13	8-64	H	S	5							O
145N073W32BDB	EARL WILSON	78	4	C				22	8-64	U	P								O
145N073W34CAA	ALBERT LANGE	222	3	C	1909			20		H	P	S							N
146N068W04BCB	U.S.G.S.	21		H	1965					U				1590			DG		
146N068W04CDD1	FRANCIS ZWINGER	25	18	B			S	6	8-64	U	P	1		1600					O
147N068W04CDD2	FRANCIS ZWINGER	11	48	D				6	9-64	U	P	6		1600					O
146N068W05ADD	F.J.LABER	84	22	B	1964	K3PD	F	7	8-64	H	S	S	5	1597	K	16		49	O
146N068W07CCC	L.SCHUMACHER	26	20	B	1959			15		H	P	5	8	1625	K				N
146N068W08AAA	CALVERT DRILL.	4395		H	1956	K PM	V			U				1597			E		
146N068W09BBD	MALT HUSS	95	22	B		K3PD		50		S				1595					N
146N068W12BCB	ERNEST MASSIL	31	30	B				16	9-65	U	P	1	4	1600	K				M
146N068W14AAD	R.A.WENSTROM	25	72	D	1915			14		H				1600					N
146N068W14DDD	MRS.W.HANLON	59	24	B				12	8-64	H	J	5		1594					O
146N068W15DCC	CLINTON KUTZ	50	22	B	1963	K3PD	F		4-66	H	S	5	4	1600	C		D	41	O
146N068W18CBB	E.WEIPPERT	77	12	B	1959		G	61	8-64	U	S	5	8	1635	K				O
146N068W21BBC	LYLE SPELDRICH	72	24	B	1963		S	28	8-64	H	S	5		1618					O
146N068W25CCC	JOHN KLOCKE	72	24	B	1956		S	25		S	P	S	8	1602	K				O
146N068W27BBA	T.RIPLINGER	17	36	D	1950		G	13	8-64	H	J	5	5	1615	K				O
146N068W29DAA	U.S.G.S.	42		H	1965					U				1645			DG		N
146N068W30CBD	R.W.KUTZ	57	12	B	1956		S	35	8-64	H	J	5		1655					O
146N068W31BAB	K.FRUHWIRTH	46	30	B				18	10-64	U			6	1675	K				M
146N069W02DCC	RICHARD BROWN	87	18	B			S	63	8-64	H	J	5	5	1632	K				O
146N069W04CAA	W.BEICH	30	32					27		H	P	5	5	1625	K				N
146N069W04DDD	U.S.G.S.	320		H	1967					U				1632			EG		N

TABLE 1, CONTINUED.

LOCATION NUMBER	OWNER OR NAME	DEPTH OF WELL (FEET)	DIAM. OF WELL (INCHES)	METHOD DRILL-ED	DATE DRILL-ED	AQUIFER	LITHO-LOGY	DEPTH TO WATER BE-LOW LAND SURFACE (FEET)	DATE OF MEASURE-MENT	USE OF WATER	LIFT AND POWER	SPECIFIC CONDUCT-ANCE	ELEVATION OF LAND SURFACE	REMARKS (1)	(2)	(3)	(4)	(5)
146N069W07BAB	WILLIAM BROWN	51	24	B	1958		S	33	8-64	H	J 5	5	1680	K				O
146N069W09BAB	HAROLD KURTZ	28	30	B			G	15	12-65	U		5	1655	K				M
146N069W10DAD	RAY RICHTER	21	36	D	1934			11	8-64	H	J 5	5	1637	K				O
146N069W11BCD	VERNON RICHTER	18	24	B	1931			4	6-66	H	P 3		1633					O
146N069W13CCC	N.D.HIGHWAY DPT	33	4	C	1964			7	10-64	P	P 1	5	1633	K				O
146N069W13DDB	SYKESTON	39	24	C	1958	QGOO	S	8	6-58	P	T T	5	1630	C	35		47	O
146N069W14AAA	ORVILLE LUNDBY	27		B				10	8-64	U	P 1		1638					O
146N069W15CDC	JOHN HAFNER	2120	2	H	1963	K1PM	V	67		H	P S	6	1660	C	20		49	
146N069W17CCB1	MELVIN RASK	157	4	C	1961	K3PD	F	45		S	P 5		1680	P				N
146N069W17CCB2	MELVIN RASK	2160	2	H	1965	K1PM	V	75	9-65	H	P S	6	1680	C				
146N069W21BDD	LEANDER RICHTER	24	30	B		QGOO	2S			H			1677			D		N
146N069W24BBA	U.S.G.S.	84		H	1966					U			1707			DG		
146N069W27AAA	U.S.G.S.	294		H	1966					U			1655			EG		N
146N069W28DAB	W.GRIFFITH	21	30	B				10	8-64	U	P 1		1680					O
146N069W32DAA	NICK RICHTER	48	24	B				17	10-64	U			1758					M
146N069W34ADA	R.HOLLINGSWORTH	16	24	D			S	8		H			1640					N
146N069W36BAC	R.NEUMILLER	29	24	B	1963		2S	14		H	P 5	6	1643	K		D		N
146N070W01CCD	W.R.WILLIAMS	26	30	B	1961		S	17	8-64	H	P S	5	1686	K				O
146N070W03CDC1	NICK WENTZ	17	36	B	1963		S	7	8-64	H	P S	5	1700	K		D		O
146N070W03CDC2	NICK WENTZ	130	4	C				66	8-64	U	N		1700					O
146N070W04DBB	ROLAND ERMAN	325	3	C	1926					H	P		1710					N
146N070W06DAA	H.J.COOK	30	30	B	1950		S	20	8-64	H	P S	5	1759	K				O
146N070W08BAA	E.M.SARGENT EST	28	30					17	8-46	H	P		1760					O
146N070W09DDD	ARTHUR ERFLE	25	22	B	1962		S	18		H			1720			D		N
146N070W11BCB	U.S.G.S.	32		H	1965					U			1695			DG		
146N070W11DAC1	HEATON	26	36	D	1935			5	5-66	P	P 1	5	1705	C			41	O
146N070W11DAC2	LYLE ANDERSON	17		D	1954			11		H	P 1	5	1705	K			40	N
146N070W13CCC1	U.S.G.S.	30	4	H	1866	QGOO	3S	4	8-66	U	N	5	1690	C	35	DG	43	M
146N070W13CCC2	U.S.G.S.	20	1	H	1966	QGOO	3S	7	8-66	U	N		1692			GD		M
146N070W16AAA	ELMER ERFLE	53	30	B				24	8-46	H	P		1730					O
146N070W17BAB	JOHN ANKRUM	15	48	D				10	9-64	U			1755					M
146N070W19AAD	J.W.PATRIE	16	36	D	1944			12	8-46	H			1777					O
146N070W19ADA	J.W.PATRIE	18	24	B	1956		G	13	8-64	H	J 5	5	1777	K				O
146N070W21DAB	ADAM STROH	26	30	B	1963		G	10	8-64	H	J 5	4	1747	K				O
146N070W23AAC	L.C.MILLER	34	36	D	1910			24	8-46	H	P		1710					O
146N070W23ADA	LLOYD MILLER	200	4	H	1962	K3PA	V	27		H	S S		1712	P		D		N
146N070W26AAA	RALPH SWART	40	24	C	1956			25	8-64	H	J 5	4	1757	K				O
146N070W27BAA	GORDON KAHL	33	28	B				18	8-64	U	P		1775					O
146N070W30BAA	H.D.PLUNKETT	400	2	C	1940	K3PD	F	20		H	P S	6	1810	C			49	N
146N070W34ADC	M.SCHAUBERT	200	2	C				50		H	P 5	6	1800	K				N
146N070W35AAA	U.S.G.S.	210		H	1965					U			1775			EG		
146N071W02BAB	D.D.BILLS	3104	7	H	1966	K PM	V			U			1751			SX		
146N071W02BCB	THEODORE KNODEL	52	3	C	1943			35		H								N
146N071W04AAA	U.S.G.S.	50	1	H	1965	QGOO	8G	3	11-65	U	N	4	1700	C		GD	46	M
146N071W08ADA	HANK REXINE	30	32	B	1963		G	10	8-64	H	J S	4	1712	P				O
146N071W09DDD	MILTON FOSSUM	280	3	C						H	P S	6		K				N
146N071W10DCD	S.M.LUND	390	2	C	1935													N
146N071W12BAA	HERMAN WIDICKER	54	36	B	1945		G	40	8-64	H	J S	5	1795	K				O
146N071W13ABD	K.THORSTENSON	24	30					16	8-46	S	P		1775					O
146N071W13DDD	U.S.G.S.	200		H	1965					U			1795			EG		
146N071W15BAA	R.KOELLER	40	48	B	1922			10	8-46				1812					O
146N071W15BAC	BOWDON	325	6	H	1947	QGOG	4S	220	10-53	P	P T		1810	P	10	D		N

146N071W15BBB	BOWDON	2480	2	H	1962	K1	V	160		P	P S	6	1800	C	15		64	
146N071W17CCC1	U.S.G.S.	368		H	1965					U			1808			EG		
146N071W17CCC2	U.S.G.S.	116		H	1965					U			1808			DG		
146N071W18CCD1	BEN HAGELIE	200	2	C	1939			150		C	P 5							N
146N071W18CCD2	BEN HAGELIE	25	30	B	1963		S	10	8-64	H	J S	5		K		D		O
146N071W18DAA	NELSON JONES	50	18	B	1909					H	P 5	5		K				N
146N071W24AAB	A.UNTERSEHER	320	2	C	1930			80		H	P S							N
146N071W32ADA	ALBERT FUHRMAN	37	30	B	1963		S	16	1-66	S	P S	6		K		D		O
146N071W32BBB	U.S.G.S.	452		H	1966					U			1855			EG		
146N071W34ADA	L.SUCKUT	115	2	C	1930		1S			U	P S	6		K				N
146N071W36BAC	R.M.KOELLER	36	22	B	1930			26		H	J S							N
146N072W01DDD	HENRY ZIRBEL	215	2	C	1953			75		H	P S							N
146N072W02ADA	L.J.WRIGHT	228	4	C	1914			77		H								N
146N072W04BBB	L.MERTZ	375	2	C						H	P S	5		K				N
146N072W04CCC1	ALICE BENTZ	21	24	B				9	9-64	U	P 1	4	1836	K				M
146N072W04CCC2	ALICE BENTZ	46	24	B				10	9-64	U	P 1		1836					M
146N072W12BBD	WALTER CZECH	205	3	H	1966		4G	80		S	P F	5	1830	P(table 5)				N
146N072W12BCB	WALTER CZECH	98	3	C	1949		S	95		H	P S	5		P(table 5)				N
146N072W14BBB	U.S.G.S.	368		H	1966					U			1832			EG		
146N072W23BDD	MARTIN NELSON	380	3	C	1914			25		H	P S	5		K				N
146N072W27DAD	CARROL HART	380	3	C				80		H	P S	6		K				N
146N072W28ADD	R.W.CARSON	38	3	C				11		H	P 5	3		K				N
146N072W34AAB	ORVAL HART	380	2					50		H								N
146N073W01BCC	BERYL RHONE	17	24	D				9		H	P 1	5		K				O
146N073W03CCB	C.S.LAUGHLIN	380	3	C						U	P 1	6		K				N
146N073W03CCC	U.S.G.S.	363		H	1966					U			1874			EG		
146N073W08DCD	B.BUCKWITZ	380	2		1959		S	12		H	P S	5		C			46	N
146N073W10CBB	N.BOHNET	416	2	C	1943	K3PC	S	F	6-66	U	N	6	1902	C	A			M
146N073W12CCB	E.NEUHARTH	61	24	B				7	9-64									O
146N073W13CCC	GUST DOCKTER	49	32	B	1956			13	8-64	H	J	5		P				O
146N073W18BAD	L.ECKMAN	640	3	C				+3	8-64	H	N	5		K			50	O
146N073W20DCC	ART DOCKTER	519	2	C	1949			18		H	J T							N
146N073W23DAD1	EMERALD KNODEL	540	5	C	1962			40		P	S 5	6	1900	K				N
146N073W23DAD2	KERMIT GRIMM	550	2	C	1950			20		H	P S	6	1900	K			49	N
146N073W23DDD	HARRIS JOHNS	470	2	C	1959	K3PC	S			C	P S	6	1900	C			47	N
146N073W25CBD1	GEORGE WILSON	24	22	B				13	8-64	S	P 1	6		K				O
146N073W26DDD	U.S.G.S.	420		H	1966					U			1820			EG		
146N073W27DDD	CONTINENTAL OIL	6033		H	1952	K PM	V			U			1922			EG		
147N068W01BBB	U.S.G.S.	105		H	1966					U			1566			EG		
147N068W01DDD	U.S.B.R.	23	3	B				5	9-64	U	N		1557					M
147N068W04BBB	U.S.G.S.	140		H	1966					U			1585			EG		N
147N068W06DBC	FRED REDDIG	90	6	C	1950	QGOG	G	50		H	P S	6	1592	K				N
147N068W09CCC	U.S.G.S.	148		H	1966					U			1587			EG		N
147N068W10ADD	U.S.G.S.	78	3	H	1965	QG1G	5R	9	10-65	U	N	5	1555	C		EG	46	M
147N068W12CBB	C.R.MEIER	80	24	B		QG1G	5R	15		H	S 5	4	1570	C			47	N
147N068W14BCC	S.SKADBERG	86	5	C	1956	QG1G	5R	40		H	J 5	5	1590	K				N
147N068W17AAA	RUDY SCHRAMM	40	36	B	1950		S	18		H	P 5		1585					N
147N068W20ADD	U.S.G.S.	220		H	1965					U			1580			FG		N
147N068W20BCA	DALE RIEDESEL	31	36	B	1945		G	9	8-64	U	P 1		1590					O
147N068W22AAA1	U.S.B.R.	22	3	B	1951			12	9-64	U	N		1585					M
147N068W22AAA2	U.S.G.S.	179		H	1966					U			1580			DG		N
147N068W24CCC	S.SKADBERG	33	26	B	1956			16	8-64	S	P 1		1583					O
147N068W25CDD	VEEN BROTHERS	30	15	B	1930		G	20		H	P 5		1591					N
147N068W25DDD1	U.S.G.S.	178		H	1959					U			1590			G		
147N068W25DDD2	U.S.B.R.	18		B		QGOG	YS	12	8-51	U			1590					O
147N068W29CCC	J.J.SOWLINSKY	8	48	D			G	6	8-64	U	P 1		1596					O

TABLE 1, CONTINUED.

LOCATION NUMBER	OWNER OR NAME	DEPTH OF WELL (FEET)	DIAM. OF WELL (INCHES)	METHOD DRILL-ED	DATE DRILL-ED	AQUIFER	LITHO-LOGY	DEPTH TO WATER BE-LOW LAND SURFACE (FEET)	DATE OF MEASURE-MENT	USE OF WATER	LIFT AND POWER	SPECIFIC CONDUCT-ANCE	ELEVATION OF LAND SURFACE	REMARKS (1)	(2)	(3)	(4)	(5)
147N068W30DDD	U.S.G.S.	21		H	1966					U			1597			DG		N
147N068W34AAA	U.S.G.S.	147		H	1966					U			1591			EG		
147N068W34CCB	EDWARD LARSON	160	4	C	1962		G	30		H	S S		1593					N
147N069W01BCB	JOHN OCKERT	31	36	B	1952			12	8-64	S	J S		1595					O
147N069W03ADD	L.P. PETERSON	76	6	C	1905		S	25	8-64	H	P 1	6	1596	K				O
147N069W05BBB	U.S.G.S.	63		H	1965					U			1595			DG		N
147N069W06ABA1	ROY KUSKE	90	5	C	1942			23	8-64	H	J S	5	1597	C				O
147N069W06ABA2	ROY KUSKE	160	6	C	1917		F	19	8-64	U	P 6	4	1597	K				O
147N069W08BBB	U.S.B.R.	23	3	B				7	8-51	U			1590					O
147N069W10BDD	OSCAR MURCHUS	60	24	B	1954		S	5	8-64	S	P S		1588					O
147N069W13BBD1	U.S.G.S.	158		H	1966					U			1580			EG		N
147N069W13BBD2	CATHAY	25	24							P	P 1	6	1580	K			44	N
147N069W13BDB	CATHAY	37	5	C	1958			18		U	S 5	6	1579	C			46	N
147N069W14AAD	SELMER VEEN	36	22	B				16	8-64	S	P S		1581					O
147N069W17AAA	EMIL BINDER	14	24	B	1963		G	7		H	P 1	4	1592	K				O
147N069W17AAD	EMIL BINDER	14	24	D				7	9-64	H	P 1		1595					O
147N069W19AAA	HENRY WACHTEL	83	28	B	1930		S	12	8-64	H	S S	6	1617	K				O
147N069W20CDD	ORVAL HEIDEN	108		H	1962								1637			D		N
147N069W30BBB	U.S.G.S.	180		H	1967					U			1633			EG		N
147N069W31CAD	RUBEN SCHANDER	86	4	C	1963		S	25		H	P S	5	1670	C			45	N
147N069W33CBA	LEE COOK	13	36	D			G	9		H	P S	6	1627	K				O
147N069W34BBB	U.S.G.S.	336		H	1966					U			1620			EG		N
147N069W36BCC	C.SCHANDER	36	32	B	1946		S	23	8-64	H	J S	5	1605	K				O
147N070W01BAB	BARNEY KRUEGER	35	30	D	1910			13	7-64	H	P S	5	1605	K				O
147N070W01DDD	U.S.G.S.	21		H	1966					U			1596			D		
147N070W02BCC	E.KINSELLA	32	48	D				12	5-46				1620					O
147N070W03BAA	H.D.BRAEGER	32	48	D				15	7-64	U	N		1617					M
147N070W04BBA	U.S.G.S.	179		H	1966					U			1618			EG		
147N070W04BBB	U.S.G.S.	210		H	1946					U			1617			G		N
147N070W05ADA	U.S.G.S.	185		H	1946					U			1617			G		
147N070W05BBB	JULE KNUTSON	16	48	D	1944			6	7-64	S	P S		1616					O
147N070W13CCC	U.S.G.S.	137		H						U			1630			EG		
147N070W14CAA	S.I.JOOS	180	6		1959					H	P S		1620					N
147N070W15CCC	H.C.LLOYD	122	20	B				9		U	P 1	5	1645	K				M
147N070W18CCC	U.S.B.R.	23	3	B	1951			9	10-64	U	N		1696					M
147N070W18DAD	J.H.PALMER	35	30	B	1930			16	7-64	H	S S	5	1682	C			46	O
147N070W19ADD	U.S.G.S.	325		H						U			1655			EG		
147N070W22ACC	HELEN COVELL	42	16	B	1890			21	7-64	S	P S		1645					O
147N070W22BBB	U.S.B.R.	17	3	B				5	6-65	U	N		1648					M
147N070W23AAC	E.H.JONES	9	48					7	7-40	S			1620					O
147N070W31AAA	U.S.G.S.	387		H	1965								1700			EG		N
147N070W32ADB	T.SCHIMELFENIG	36	22	B	1958			18	7-64	H	P S	6	1710	K			47	O
147N070W34DDD	A.H.BEAN	26	36	D	1910			16	7-64	S	P S		1700					O
147N070W36CBC	ARNOLD ERFLE	31	20					17		S	P	4	1675	K				O
147N071W01CCC	L.R.PRICE	6	60	D				1	5-46				1665					O
147N071W03BBB	U.S.B.R.	23	3	H	1951			10	8-51	U	N		1670					O
147N071W04DDD	JOHN EHNI	150	2	C	1936			20		H			1676					N
147N071W06DDD	U.S.G.S.	100		H	1967					U			1665			DG		N
147N071W07DDA	ROY OLSCHLAGER	19	30	B				10	7-64	S	P 5		1671					O
147N071W09DAD	DARWIN TALLMAN	27	26	B	1963		S	16	7-64	H	P 5	5	1682	K		D		O
147N071W11BBC	U.S.G.S.	62		H	1946					U			1690			D		
147N071W12DBB	EMIL FIEBICK	64	36	B	1930			14	7-64	H	P S	6	1675	K				O

147N071W15DDD	CLARENCE MARTIN	15	24	D				10		S	C	S	6	1695	K				O
147N071W17CDC	JOHN BENNETTO	39	30	B	1940		S	10	7-64	H	J	5	4	1694	K				O
147N071W19AAA	U.S.G.S.	42		H	1965					U				1690			DG		
147N071W22BBB	U.S.B.R.	13	3	H	1951			8	8-51	U	N			1702					O
147N071W25AAA	H.KELLNER	60	30	B	1941					H	P	1		1707					N
147N071W31AAA	HUNT OIL	5250		H	1954	K PM	V			U				1689			E		
147N071W31BBB	U.S.G.S.	84		H	1966					U				1693			DG		
147N071W32DCC	TOLEDO SOGN	160	3	C	1910			35		H	P	S		1717					N
147N071W34DDD	PALMER JOHNSON	17	30	B	1963			9	7-64	U	N		5	1735	K				O
147N072W02AAD	DICK ENGBRECHT	120	4	C	1960		S	13		H	P	S		1655					N
147N072W03BBB1	U.S.B.R.	24	3	B	1951			6	10-64	U	N			1665					M
147N072W03BBB2	U.S.G.S.	83		H	1966					U				1665			DG		N
147N072W03CBB	U.S.G.S.	120	1	H	1967	QG	4G	18	6-67	U	N			1641	C		EG		O
147N072W05AAC	EMILIE KESON	27	36	B				14	9-66	U	P	1		1655					O
147N072W05CCC	U.S.G.S.	126		H	1966					U				1655			EG		
147N072W06AAA	U.S.B.R.	18	3	B				9	7-51	U	N			1648					O
147N072W06BBB	U.S.G.S.	87	1	H	1966	QG	9S	7	8-66	U	N		5	1640	C		EG		M
147N072W09DAB	MARTHA HALUSKA	185	3	C	1930			40		S	P	F		1650					N
147N072W12DDD	U.S.G.S.	116		H	1966					U				1675			EG		
147N072W15DDD	U.S.G.S.	52		H	1966					U				1673			DG		
147N072W16AAA	U.S.G.S.	74		H	1965					U				1665			DG		
147N072W17BCC	U.S.G.S.	231		H	1966					U				1690			EG		
147N072W17CCA	FRED HIEB	6	48	D	1952			1	7-64	U	N			1675					O
147N072W19AAA	FRED HIEB	58	3	C	1951			17		H	P	S		1702					N
147N072W23CBB	R.STEINBACH	21	36	D				16	9-66	U	P	1		1672					O
147N072W23CCD	J.C.OPP	27	32	B	1955			11		H	P	S	4	1677	K				O
147N072W23DDD	U.S.G.S.	80		H	1967					U				1675			DG		N
147N072W26CBA	A.WRIGHT	32	4	C				9	9-64	U	P	6	4	1687	K				O
147N072W32ABD	C.F.BEST	380	2	C	1957			40		H	P	S	5	1743	C			47	N
147N072W33DCD	HENRY HAUX	380	2	C	1946			150		H	P	S		1790					N
147N072W35ADB	E.ROGNESS	19	36	D				13	7-64	S	P	6		1702					O
147N073W01CBC	HERBERT SCHIMKE	160	6	C	1915			60		U				1695					N
147N073W01CCC	U.S.G.S.	220		H	1967					U				1743			EG		N
147N073W02BAB	C.SCHINDLER	100	3	C	1932			40		S	P	S		1680					N
147N073W03CCC	U.S.G.S.	315		H	1966					U				1880			DG		
147N073W03DDB	F.T.SCHMIDT	220	3	C	1962			50		H	P	S		1850					N
147N073W03DDC	F.T.SCHMIDT	225	2	C	1939			93	7-64	U	N			1850					O
147N073W04CCC	JAKE FAUL JR.	20	36	B	1961			7	7-64	H	P	S	4	1895	K				O
147N073W11CAD	W.KNUTSON	212	2	C										1865					N
147N073W12CCC	L.L.STADELMAN	315	2	C	1937		G	180						1850					N
147N073W18BCD	M.KITTLESON	320	2	C	1956		F	180		H	P	5		2000					N
147N073W22DAA	ALVIN HENNE	170	4	C	1961			80		S	P	6		1900					N
147N073W27BBA	L.FRITCHIE	16		B	1962			F		S	N			1850		F			O
147N073W27DAA1	L.FRITCHIE	2600	3	H	1963	K PM		200		S	P	S		1650					N
147N073W27DAA2	L.FRITCHIE	38	22	B	1960			8	7-64	S	P	S		1852	P				O
147N073W32DCA	CLIFFORD BERG	30	21	B	1960			10	7-64	S	P	1		1907					O
148N068W01BCB	H.C.O'CONNOR	108	5	C	1963	QGOG	8G	20		H	P	S		1561					N
148N068W03DDD	U.S.B.R.	14	3	B				6	6-65	U	N			1564					M
148N068W05CAB	R.N.LIES	74	5	C	1954		S	24		H	J	5		1575					N
148N068W08BBB	U.S.B.R.	21		B	1951			9	7-51	U				1581					O
148N068W10ABB	MRS.A.ULRICH	52	18	B				12	7-64	H	J	S	5	1554	K				O
148N068W10ADA	U.S.G.S.	58	1	H	1965	QG1S	3S	2	10-65	U	N		5	1555	C		EG	45	O
148N068W14AAA	W.SCHAFER	21	48	D	1850			18	7-64	S	P	5		1558					O
148068W15DDD	U.S.B.R.	17		B	1951			6	7-51	U				1562					O
148N068W16ABB	L.SCHAGUNN	100	5	C	1961		S	15		S	P	5		1574					N
148N068W20BAC	B.KRENZEL	115	4	H	1963		G	7		H	J	S		1570			D		N

TABLE 1, CONTINUED.

LOCATION NUMBER	OWNER OR NAME	DEPTH OF WELL (FEET)	DIAM. OF WELL (INCHES)	METHOD DRILL-ED	DATE DRILL-ED	AQUIFER	LITHO-LOGY	DEPTH TO WATER BE-LOW LAND SURFACE (FEET)	DATE OF MEASURE-MENT	USE OF WATER	LIFT AND POWER	SPECIFIC CONDUCT-ANCE	ELEVATION OF LAND SURFACE	REMARKS (1)	(2)	(3)	(4)	(5)
148N068W20CBC	O.J.BRECTO	14	6	C				7	9-64	U	P 1		1580					O
148N068W25CCD	JOSEPH SCHAEFER	33	4	C			S	14	8-64	U			1561					O
148N068W25DDD	U.S.B.R.	17		B	1951			8	7-51	U			1562					O
148N068W26BCC	U.S.G.S.	179		H	1966					U			1565			EG		
148N068W28ACB	MELVIN SEIBOLD	114	6	C	1955		G	5		H	S		1572					N
148N068W29BBC	OSCAR BRECTO	42	30	D	1932			15	7-64	H	J S		1585					O
148N068W32BAA	VICTOR STOKES	152	5	C	1917	K3PD	F	15		H	J 5	6	1580	C			50	N
148N069W06BAA	U.S.B.R.	16								U			1560			D		
148N069W06CDD	U.S.B.R.	22		B				8		U	N		1598					O
148N069W07ADA	U.S.G.S.	189		H	1966					U			1600			EG		
148N069W08CCC	H.E.RUDEL	100	24	B	1939			16	7-64	S	B 1		1592					O
148N069W10ADA	L.BIBELHEIMER	25	24	B	1918		S	14	7-64	U	P S		1591					O
148N069W10DAD	OTTO FAUL	12	2					3	9-64	U	P 1		1589					M
148N069W12DCB	ARLO SEIDEL	29	36	B	1940			17	7-64	H	P S		1589					O
148N069W13BCC	U.S.G.S.	168		H	1966					U			1590			GD		
148N069W13DBA	HERBERT SEIBOLD	32	30	D			G	19	7-64	H	J S	5	1591	K				O
148N069W18CBC1	ROGER RUDEL	110	5	C	1954		S	50		H	S S		1600					N
148N069W18CBC2	ROGER RUDEL	109						23	7-64	U	N		1600					O
148N069W20CCB	C.M.SEIBEL	128	4	H				18	9-64	U			1602					M
148N069W26ABB	WESTON RUDEL	100	6	C				25		H	J S		1590					N
148N069W28AAA	U.S.G.S.	160		H	1967					U			1595			EG		N
148N069W31CAA	CYRUS CLOUGH	21	24	B	1947		S	14	7-64	H	P S	5	1593	K				O
148N070W01DDD	E.F.MAXWELL	196	24	C				40	7-64	H	P 6		1602					O
148N070W06CDD	PAUL LEITNER	140	18	B				115	7-64	H	P S	5	1612	K				O
148N070W07DDD	U.S.G.S.	164		H	1946					U			1610			D		
148N070W08CBD	U.S.G.S.	148		H	1946					U			1612			D		
148N070W08CDC	U.S.G.S.	180		H	1946					U			1610			D		
148N070W10BBC	R.J.PRICE	120	6	C	1936			40		S	P 6		1600					N
148N070W13BAA	KERMIT RUDEL	2360	2	H	1961	K1PM		F	8-64	C	N	6	1603	C	30		70	O
148N070W14CCC	U.S.G.S.	200		H	1967					U			1600			EG		N
148N070W17BAA	LEONARD MARTIN	140	6	C	1940			70		H	P S		1608					N
148N070W17BCB	U.S.G.S.	227		H	1946					U			1615			D		
148N070W18ADA	U.S.G.S.	186		H	1946					U			1616			D		
148N070W21BBC	RALPH MEHLHOUSE	16	48	D				5	5-46	U			1605					O
148N070W22CBC	JOHN MEHLHOUSE	167	7	C	1952		S	153		H	P S		1600					N
148N070W26DDD	U.S.G.S.	221		H	1966					U			1604			EG		
148N070W28CDB	C.E.LYNESS	137	4	C	1935			13	5-46				1612					O
148N070W31BBB	H.E.HOORNAERT	202	2	C	1963			18		S	J 5		1620					N
148N070W32CCB	U.S.G.S.	294		H	1945					U			1615			G		
148N070W32DAA	U.S.G.S.	200		H	1946					U			1615			G		
148N070W32DDD	U.S.G.S.	220		H	1946					U			1615			G		
148N070W34CCC	HAROLD BRAEGER	170	5	C	1952		G	40		S	P S		1620					N
148N070W35CBB	NICK JULIAR	150	5	C	1922			25		H	S S		1605					N
148N071W01BCB	HENRY WEIGELT	60	18	C				25		H	J 5	6	1613	K				N
148N071W04DCB	D.HILDENBRAND	90	2		1928			25		H	J S		1606					N
148N071W06ADA	C.E.ANHORN	96	6	H				12	6-65	U	P 6	4	1610	K				M
148N071W07DBC	ARNOLD KNODEL	180	4	C	1961			70		S	P S		1610					N
148N071W09BBA	U.S.G.S.	221		H	1966					U			1606			EG		
148N071W12BAD	U.S.G.S.	220		H	1946					U			1610			D		
148N071W12BBC	U.S.G.S.	209		H	1946					U			1615			D		
148N071W12DAA	E.K.KRUEGER	52	30	B	1938			27	5-46	U			1615					O
148N071W13CCC	U.S.G.S.	200		H	1966					U			1605			EG		N

148N071W14DCD	C.HUNT ESTATE	5182		H	1954	K PM	V			U			1601			EG		
148N071W15AAD	BERNICE LEITNER	78						24	8-45				1605					O
148N071W18AAA	U.S.G.S.	210		H	1965					U			1610			EG		
148N071W19CAB	D.ENGBRECHT	11	38	D				5	5-46				1628					O
148N071W19CCC	U.S.G.S.	40		H	1967					U			1641			DG		N
148N071W19CDD	U.S.G.S.	85		H	1967	QG1G	9S			U	N		1637			EG		N
148N071W20BDD	D.HIRSCHKORN	245	4	C	1961			13		S	P S		1615					N
148N071W22DCA	F.W.RUDEL	57	24	B				35		S	P 6	6	1626	K				O
148N071W24DDD	U.S.G.S.	92	1	H	1966	QG1G	9S	10	11-66	U	N	6	1613	C		EG	45	M
148N071W25AAC	A.BOYWITT	100	24	B	1954			14	7-64	S	P 6		1619					O
148N071W26DCC	CHARLES KRAHLER	37	24	B				12	9-64	U	N		1631					M
148N071W26DDD	U.S.G.S.	60		H	1967					U			1600			DG		N
148N071W28AAA	U.S.B.R.	23	3	H	1951			10	9-64	U	N		1625					M
148N071W29BBB	U.S.G.S.	40		H	1967					U			1635			DG		N
148N071W29CBB	W.OLSCHLAGER	80	36	B	1963	K3PC	V	18	4-66	H	S 5	6	1641	C		D	44	O
148N071W32BBB	U.S.G.S.	80		H	1967					U			1652			DG		N
148N071W33ADD	ADOLF NEUMAN	32	6	B	1956	K3PC		F		S	N	6	1640	C	1		45	O
148N071W34ABB	GUST KNODEL	115	36	B	1925			8	7-64	H	P S		1636					O
148N072W01CDD1	ERVIN KESON	300		H	1963								1605			D		
148N072W01CDD2	ERVIN KESON	27	30	B	1963			14	7-64	S	P 6	6	1607	K				O
148N072W02BCA	A.A.KNODEL	21	36	B				13	9-66	S	P S	6	1607	K				O
148N072W04BAA	RUEBEN MORTON	13	36	D	1956		G	5	9-66	S	P 6	6	1605	C			53	O
148N072W04BDB	MARY MARTIN	16	48	D	1961			9	7-64	S	P S		1609					O
148N072W06AAC	U.S.G.S.	60		H	1967					U			1615			DG		N
148N072W08BBC	U.S.G.S.	105		H	1966					U			1620			EG		
148N072W08BCC	LEO KAUL	33	36	B	1947			24	9-64	U	P 1		1637					O
148N072W09CCC	U.S.G.S.	38	1	H	1966	QG	9S	6	9-66	U	N	5	1620	C		EG	45	M
148N072W09DDC	U.S.G.S.	40		H	1967					U			1610			DG		N
148N072W10DCC	U.S.G.S.	20		H	1967					U			1625			DG		N
148N072W10DDC	U.S.G.S.	40		H	1967					U			1617			EG		N
148N072W11DDD	U.S.G.S.	140	1	H	1967	QG1G	G			U	N		1615			EG		N
148N072W13BCC	B.B.MILLER	21	36	D	1909		G	14	7-64	H	C S	5	1623	K				O
148N072W15ABA	U.S.G.S.	97	1	H	1965	QG	9S	3	11-65	U	N	5	1615	C		EG	45	M
148N072W18ADA	L.THON	230	3	C	1952			30		H	J S		1647					N
148N072W19CCC	EDWIN WINTERS	172	2	C	1927			21		H	P S	5	1648	K				N
148N072W20DDD	U.S.G.S.	32		H	1966					U			1635			DG		N
148N072W23BCC	C.TEBELIUS	25	48	D				10	9-64	U	P		1647					O
148N072W24CDD	U.S.G.S.	20		H	1967					U			1648			DG		N
148N072W25AAA	D.E.MILLER	40	4	C	1960			40		S	P S		1640					N
148N072W26AAA	U.S.G.S.	31		H	1966					U			1650			DG		
148N072W26BBB	U.S.G.S.	60		H	1967					U			1645			DG		N
148N072W29ADD	ARTHUR TREFT	27	48	D	1910			11		S	P 6	4	1645	K				N
148N072W29CCC	U.S.G.S.	63		H	1966								1649			DG		
148N072W32CBD	G.S.KROLL	23	60	D				12	7-64	H	P 6	5	1651	K				O
148N072W34BBB	U.S.G.S.	178		H	1966					U			1645			EG		
148N072W34BCC	MIKE FISCHER	30	28	B				24	9-66	U	N		1656					O
148N072W34DAD	U.S.G.S.	95	1	H	1966	QG	8G	12	8-66	U	N	4	1645	C		DG		M
148N072W36DDD	U.S.G.S.	80		H	1967					U			1661			DG		N
148N073W01BBB	U.S.B.R.	12	3	B				6	7-51				1634					O
148N073W04CCC	ALLAN SCHALE	150	3	C				40		H	P 5		1647					N
148N073W05AAA	EDWIN RELLER	80	4	C	1910			60		H			1635					N
148N073W05DCC	JACK FAUL	158	3	C	1938			41	6-46	H	P 6		1630					O
148N073W06DAC	J.J.SEIBEL	165	3	C	1926					H			1645					N
148N073W07CDC	OTTO NUTZ	165	2	C	1914			42	6-46	H	P 6		1626					O
148N073W08BDD	GUST LIEBELT	170	4	C				26		H	P		1625					N
148N073W08DAB	PAUL MAGSTADT	135	6					50		H			1630					N

TABLE 1, CONTINUED.

LOCATION NUMBER	OWNER OR NAME	DEPTH OF WELL (FEET)	DIAM. OF WELL (INCHES)	METHOD DRILL-ED	DATE DRILL-ED	AQUIFER	LITHO-LOGY	DEPTH TO WATER BE-LOW LAND SURFACE (FEET)	DATE OF MEASURE-MENT	USE OF WATER	LIFT AND POWER	SPECIFIC CONDUCT-ANCE	ELEVATION OF LAND SURFACE	REMARKS (1)	(2)	(3)	(4)	(5)
148N073W09CCC	EDWIN FAUL	136	6	C	1930			60		H	P		1647					N
148N073W09DCA	E.BRODEHL	160	2	C	1960			50		S	P 5		1650					N
148N073W10DAD	D.D.BILLS	3409	7	H	1966	K PM	V			U			1629			JS		
148N073W11CAC	MELVIN MATHISON	80	2	C	1949			11		H	P S		1626					N
148N073W12CCA	L.FAUL	160	2	C	1950	K3PC				C	C 5	5	1626	C			48	N
148N073W13BDD	CARDINAL DRILL.	3497		H	1953	K PM	V			U			1629			EG		
148N073W14ADD	U.S.G.S.	21	1	H	1965	QG	3G	3	12-65	U	N	6	1615	C		DG	45	M
148N073W14BCC	T.C.FAUL	106	4	C	1939					H			1626					N
148N073W15AAA	U.S.B.R.	25	3	B				4	7-51	U			1625					O
148N073W18DDD	U.S.G.S.	42		H	1965								1645			DG		
148N073W19ACC	LLOYD BAIER	200	2	C	1910			110		H	P S		1685					N
148N073W22ABB	ALVIN FILLER	107	2	C	1928			16					1625					N
148N073W23AAD	C.F.FAUL	140	2	C	1920			10		H	P 6		1645					N
148N073W23DCB	EMIL FAUL	96	3	C	1920			4		H	J S	5	1636	K				O
148N073W24ADD	W.HEITMANN	120	6	C						H	J 5	5	1638	K				N
148N073W25AAA	U.S.G.S.	73		H	1966								1640			EG		
148N073W26BBB	U.S.G.S.	42		H	1966								1632			DG		
148N073W28BCC	VAL GOLDADE	64	36	B	1900					H	P S		1693					N
148N073W29BBA	OTTO SCHIMKE	165	2	C	1928			57		H	P 6							O
148N073W30AA	APCO OIL CORP.	3768		H	1964					U			1817			E		N
148N073W30DAB	TED MINDT	300	2	C	1930					H	P S	5		K			40	N
148N073W33BCA	GUS NELSON JR.	226	2					190		H	P 5		1820					N
148N073W34AC	APCO OIL CORP.	3421		H	1964					U			1663			E		N
148N073W34BBB	U.S.G.S.	74		H	1966								1660			EG		
148N073W35DAA	U.S.G.S.	72	1	H	1965	QG	8G	1	4-66	U	N	5	1635	C		DG	45	M
148N073W36ABB	ERVIN ANHORN	90	2		1953			12		H	J S		1640					N
149N068W01AAA	R.J.OLSON	39	36	B	1940		S	29	9-46	H	P F		1619					O
149N068W03CCB	U.S.G.S.	110		H	1946					U			1562			G		N
149N068W03CDD	U.S.B.R.	15		B						U			1548			G		N
149N068W03DDA	U.S.B.R.	15		B						U			1547			G		N
149N068W04BBC	F.J.ARENDT	18		V			S	14		H		4	1562	K				N
149N068W04CCB	R.O.KNUTSON	22	1	V	1943	QGOO	4G	18		H			1535					N
149N068W05AAD	U.S.G.S.	139		H	1946					U			1557			G		N
149N068W05ADB	U.S.G.S.	125		H	1946					U			1560			G		N
149N068W05DAD	U.S.G.S.	60		H	1946					U			1535			G		N
149N068W05DBC	GREAT NORTHERN	17	24	D		QGOO	G			H	P 1	4	1547	C			43	N
149N068W05DDD	RAY O'CONNOR	22	2	V	1912		G	20		H	P 1		1547	P				N
149N068W07BCC	E.D.BUECHLER	23	36					10	8-46	H	P 1		1580					O
149N068W08AAD	U.S.G.S.	75		H	1946					U			1543			G		N
149N068W08BAA	J.BOLLINGBERG	40	32	D	1926			23	7-64	H	P 1		1568					O
149N068W09AAD	E.J.LANGE	22	36	B	1905		G	7	8-46	H			1534					O
149N068W09BBB	U.S.G.S.	59		H	1946								1548			G		N
149N068W11AAD	U.S.B.R.	9		B						U			1547			G		N
149N068W14ADD1	EDMUND HARTL	29	36	D				25		H	P 1		1555					N
149N068W14ADD2	EDMUND HARTL	175	6	C	1919		S	27		H	P S		1555					N
149N068W15CCB	F.J.HITZ	178	4	C	1962		S	40		H	P S		1575					N
149N068W16BBB	U.S.G.S.	240		H	1946								1560			G		N
149N068W17AAA	U.S.B.R.	15		B									1560			G		N
149N068W17BBC	U.S.B.R.	15		B									1553			G		
149N068W17DDD	U.S.G.S.	269		H	1946								1552			G		N
149N068W18ADA	H.BOLLINGBERG	172	4	C	1964		2G	37		H	S 5		1574					N
149N068W20DAD	W.W.BUECHLER	69	6	H				33	9-64	U	P 1		1567					M

149N068W21CBC	U.S.G.S.	238	1	H	1965	QG1S	3S	30	10-65	U	N		5	1565	C		EG	45	M
149N068W27DDA	GEORGE HITZ	80	4	H	1964		S	30		H	S	S		1562					N
149N068W28CBB	ST.JOSEPH CH.	200	4	C	1963		S	50		T	P	S		1577					N
149N068W32BAB	JAMES HELENSKE	90	12	B	1895		S	27	7-64	H	P	S		1577					O
149N068W32DDA	U.S.G.S.	116		H	1966					U				1560			EG		
149N068W34CBC	ROMEO LIES	13	1	V				7	10-64	U				1557					O
149N068W35BBC	U.S.G.S.	126		H	1965									1560			EG		N
149N068W35DDD	HENRY ALLMARAS	85	5	H	1964		G	24		H	J	5	5	1563	P				N
149N069W03AAA	U.S.G.S.	160		H	1967					U				1548			EG		N
149N069W03BCC	O.N.IVERSON	15	36	D				10	6-46	H				1540					O
149N069W04BBB	EARL NEWMAN	4	36	D				3	6-46	S				1544					O
149N069W04BCB	U.S.G.S.	40		H	1946									1535			G		
149N069W05AAA	U.S.G.S.	204		H	1946					U				1547			G		
149N069W05CDD	WILLIAM ZEIEN	163	4	C	1914		S	30		H				1582					N
149N069W05DAA	U.S.G.S.	316		H	1946					U				1570			G		
149N069W05DDD1	U.S.G.S.	296		H	1946									1585			G		
149N069W05DDD2	U.S.G.S.	200	4	H	1966	QG52	3S	22	8-66	U	N		5	1582	C		EG	47	O
149N069W06CCC	MAURICE HAUGEN	160	4	C	1918			58	6-46	S				1590	P				O
149N069W07ADD	ALVIN NEUMAN	130	3	C	1914			110		S				1591					N
149N069W08AAD	U.S.G.S.	290		H	1946					U				1580			G		
149N069W09ACC	CARRIE ZELLMER	14	24	D	1915		S	8	7-64	U				1578					O
149N069W10BCC	DONALD NEWMAN	28	22	B	1963		S	18		H				1577			D		N
149N069W11ADA	JOHN SELLIE	168	6	H	1947		S	10		H	J	5	5	1545	K				N
149N069W11CCA	U.S.G.S	176	1	H	1967			43	6-67	U	N			1577	C		EG		O
149N069W12BBC	U.S.G.S.	210		H	1065					U				1545			EG		
149N069W13CCC	U.S.B.R.	15								U				1555			G		
149N069W14ADD	HARRY DABLOW	140	4					45	9-64	U				1581					O
149N069W17ADD	KLENWORTH BROS.	210	6	C				10		H				1592					N
149N069W18ADB1	W.A.KEMMER	39	24	B				10	9-64	U	P	1	5	1593	K				M
149N069W18ADB2	W.A.KEMMER	215	2	C	1931		G	100		U	P	1	4	1593	K				N
149N069W19BBA	E.H.BECK	33	30	D	1918			9	7-64	H	P	S		1595					O
149N069W20DDA	U.S.G.S.	242		H	1966					U				1595			EG		N
149N069W21ABC	H.PROEFROCK	179	6	C	1920			75		H	P	S		1582					N
149N069W23DCB	J.BOLLINGBERG	180	2	C	1907			35		H	P			1587					N
149N069W24BCC	U.S.G.S.	277	1	H	1065			39	10-65	U	N		5	1575	C		EG	45	M
149N069W25BAA	ALVIN RATZAK	190	4	C	1921			60		H				1581					N
149N069W26BAA	JAMES ZEIEN	185	5	C	1917		S	57	7-46	C	P	S		1585					O
149N069W28DDC	G.O.KRAMER	13	36	D				6	9-64	U	N			1591					M
149N069W29BCC	E.C.HEINS	176	4				S	68	7-46	U				1598					O
149N069W31BAB	BERT WERZEL	212	6	C	1947			100		H	P	S		1602					N
149N069W35ADC	U.S.G.S.	190		H	1946									1580			D		
149N070W01BBB	EVERETT SCHEER	120	5	C	1913		G	80		H				1595					N
149N070W02AAA	U.S.G.S.	79	1	H	1965	QG	4S	58	10-65	U	N		6	1595	C		EG	45	M
149N070W03ADA	C.E.ALBRECHT	76	6	C	1964		G	45		H	P	5		1596		3			N
149N070W03CBB	U.S.G.S.	199		H	1946					U				1596			G		
149N070W04CCC	J.H.ROGELSTAD	220	5	C	1919			82	6-46	U				1604	P				O
149N070W04DAA1	FESSENDEN	207	10	C	1948	QG	9S	21	10-48	P	T	5	5	1590	C	150	D	50	N
149N070W04DAA2	FESSENDEN	170	5	C	1947	QG	S	11	5-47	P	T	5		1590	P	60	D		O
149N070W06BBB	KERMIT LARSON	200	5	C	1915			67	6-46	S	P	S		1600	P				O
149N070W06DDD	U.S.G.S.	260		H	1967					U				1600			EG		N
149N070W09DAA1	U.S.G.S.	197	1	H	1966	QG	5S	66	5-66	U	N		6	1610	C		EG	45	M
149N070W09DAA2	U.S.G.S.	99	1	H	1966	QG	4S	66	5-66	U	N			1610			EG		M
149N070W12CDD	H.HAUGEN	145	4	C	1916			15		U				1592					N
149N070W13DCD	W.C.MASON	150	5	C	1944					U				1600					N
149N070W16ADA	W.GRAUMANN	165	5	C	1925		S	26	6-46	U	P			1606					O
149N070W16DCC	ADOLPH NEUMAN	110	5	C	1957		S	85		H	P	S		1612					N

TABLE 1, CONTINUED.

LOCATION NUMBER	OWNER OR NAME	DEPTH OF WELL (FEET)	DIAM. OF WELL (INCHES)	METHOD DRILL-ED	DATE DRILL-ED	AQUIFER	LITHO-LOGY	DEPTH TO WATER BE-LOW LAND SURFACE (FEET)	DATE OF MEASURE-MENT	USE OF WATER	LIFT AND POWER	SPECIFIC CONDUCT-ANCE	ELEVATION OF LAND SURFACE	REMARKS (1)	(2)	(3)	(4)	(5)
149N070W16DDD	U.S.G.S.	273		H	1966								1597			EG		
149N070W22BCC	H.L.GRAUMANN	209	3	C	1924			46	6-46	U			1606					O
149N070W24ADA	ORDEAN EBEL	53	24	B				33	7-64	H	P		1607					O
149N070W24BBA	U.S.G.S.	252		H	1965					U			1600			EG		
149N070W26CDB	D.S.LITKE	18	18					10		U	P 1		1582					M
149N070W30ADA	ERVIN WIESE	24	32	B	1962		G	7	7-64	H	J S		1592					O
149N070W34CBC	GEORGE LITKE	26	28	D	1925			10	7-64	U	P S		1610					O
149N071W02DAD	SOLBERG BROS.	36	36	D	1900		G	17	7-64	S	P 6		1601					O
149N071W04ABA	U.S.G.S.	94		H	1965					U			1620			EG		
149N071W06DCC	U.S.G.S.	336		H	1966					U			1610			EG		
149N071W07CBD	WALTER LARSON	23	28	D	1920			7	7-64	U	P S		1615					O
149N071W09ADA	E.NELSON	37	48	D				22	7-64	S	P 6		1605					O
149N071W09DDD1	U.S.G.S.	63		H	1966					U			1610			DG		
149N071W09DDD2	ED HEDAHL	44	24	B				18	7-64	U	N		1610					M
149N071W14DBB	E.HEDAHL EST.	80	24	B				21	7-64	U	N		1607					O
149N071W19BDB	EDWIN OPDAHL	86	3	H	1961		S	14		H	P S		1604					N
149N071W19CCA	U.S.G.S.	240		H	1967					U			1613			DG		N
149N071W19CCB	U.S.G.S.	200		H	1967					U			1617			EG		N
149N071W19CDA	U.S.G.S.	200		H	1967					U			1602			EG		N
149N071W19CDD	U.S.G.S.	158	1	H	1966	QG	7S	6	8-66	U	N	5	1610	C		EG	47	M
149N071W20CAC	U.S.G.S.	32		H	1966					U			1597			DG		
149N071W21CCB	U.S.B.R.	12		B	1958					U			1592			G		N
149N071W22BCB	EDWIN HEDAHL	55	36	B				30		U	P		1617					M
149N071W22CCC	V.O.NELSON	17	36	D	1952			12	7-64	H	P S		1612					O
149N071W25DDA	U.S.B.R.	12								U			1585			G		
149N071W27CBC	U.S.G.S.	42		H	1965					U			1605			DG		
149N071W28DAB	SOO LINE RR.	28	36	B	1961	K3PC	8P	4	5-66	P	P 1	5	1605	C			43	O
149N071W31CCB	U.S.G.S.	126	1	H	1967			26	6-67	U	N		1605	C		EG		O
149N071W32DAD	HAROLD SAUTER	162	2	C	1964			20	7-64				1614					O
149N071W34DCD	BERT FEHR	46	24	B	1948			8	7-64	H	P S		1611					O
149N072W03AAA1	U.S.G.S	231		H	1966					U			1605			EG		
149N072W03AAA2	U.S.G.S.	48	1	H	1966	QG	3S	12	7-66	U	N	6	1605	C		DG	47	M
149N072W06BBD	N.D.S.WATER COM	80		B	1960					U			1542			G		
149N072W06CAD	U.S.G.S.	116		H	1966					U			1600			EG		
149N072W07AAA	FRANK HAGER	2310	2	H		K PM	V	F	9-65	C	S 5	7	1600	C			76	N
149N072W07DDD	EMILIE KESON	110	3	H	1966	K3PC	V			S	P 5	5	1615	C			45	N
149N072W08DAD	CLARENCE FIX	12	36	T	1964		S	8	7-64	H	J S		1612					O
149N072W10BAA	GEORGE FIX	28	1	V	1958		S			H	J S		1621					N
149N072W11ADD	WILLIAM LORZ	20	72	D	1915		S	15	7-64	H	P S		1610					O
149N072W15BBB	U.S.G.S.	231		H	1966					U			1590			DG		
149N072W18AAA	U.S.B.R.	15						10	7-51	U			1616					O
149N072W18BCB	B.WERTH	23	32	B			S			H			1620			D		N
149N072W19DDD	U.S.G.S.	32		H	1965					U			1620			DG		
149N072W20AAA	E.E.SEIBEL	13	36	D				9	9-64	U	P 1		1617					M
149N072W22ADD	F.WEINMANN	18	36	D			G	15	7-64	H	P 6		1618					O
149N072W24ACC	JOHN WEISSER	16	36	D			G	7	7-64	S	P S		1603					O
149N072W24DDB	U.S.G.S.	110	1	H	1967			13	6-67	U	N		1608	C		EG		O
149N072W25BBB	U.S.G.S.	21		H	1966					U			1600			DG		
149N072W29ABB	K.MCKINVEN	230	3	C	1941					H			1647					N
149N072W30ABB	JOHN KELLER JR.	19	36	D				14	7-64	S	P S		1618					O
149N072W31CCB	ROBERT FREEH	25	24	D				12	5-66	S	P 6	4	1635	K				O
149N072W32BBB	ROBERT HEITMANN	190	2	C	1934			19		H			1620					N

149N072W33AAA	U.S.G.S.	80		H	1967					U				1623			DG		N
149N072W33CCA	U.S.G.S.	40		H	1967					U				1615			DG		N
149N072W33DBB	U.S.G.S.	40		H	1967					U				1615			DG		N
149N072W34BBA	RICHARD MILLER	13	32	D	1944		S	7	7-64	S	P	S		1612					O
149N072W35DDD	U.S.G.S.	231		H	1966					U				1602			EG		
149N072W36CDC	CALVIN BENDER	32	36	B				17	3-64	U	P			1617					O
149N072W36DAD	U.S.G.S.	220		H	1967					U				1615			EG		N
149N073W01AAA	GABRIEL STEIN	26	36	D	1921			16	7-46	H	P			1564					O
149N073W03DAA	P.S.RUBY	27	30	B				21	9-64	U	P			1625					M
149N073W04CCD	EVALD INGEBO	31	48	D	1912		S	21	5-66	H	J	S	4	1619	K				O
149N073W08ADD	U.S.G.S.	11		H	1965					U				1590			DG		
149N073W08DDC	JACOB DIETRICH	15	42	D	1925			10	7-64	H	P	T		1612					O
149N073W09BBB1	U.S.G.S.	42		H	1965					U				1610			DG		N
149N073W09BBB2	E.R.STRAND	80		B		K3PC	V			S	P	S	4	1610	C			44	N
149N073W12DAD1	ERVIN SEIBEL	26	48	D	1900			22	6-46	H	P	1		1620	P				N
149N073W12DAD2	ERVIN SEIBEL	190	3	C	1932			18		H	P			1620					O
149N072W18BCB	BEN WERTH	23	32	B			S			H	P	S		1620			D		N
149N073W13ABA	ALBERT REISWIG	164	2	C	1941		V	18		H	P	S		1615					N
149N073W13CCC	LEROY BECHTHOLD	65	24	B	1900			47		H	P			1603					N
149N073W21DCD	NORBERT SCHMITZ	140	6	C	1914			70		S	P	S		1642					N
149N073W26CBC	E.TEBELIUS	168	2	C	1944			60		H	J	S		1612					N
149N073W31AAA	D.G.GRAUMANN	140	4	C	1963			60		H	C	S		1662					N
149N073W34CCB	ERVIN SEIBEL JR	40	24	B			S	23	7-46	S	J	S		1642					O
149N073W35BB	U.S.B.R.	150		H	1952					U				1634			G		
150N068W03DAA	ORLEY ANDERSON	38	24	B				19	9-64	U	P	1		1542					M
150N068W05DAD	JOHNSON BROS.	23	30	D			S	6	7-64	H	P	S		1545					O
150N068W09AAA1	MINNIE ANDERSON	34	30	D	1900			25	7-64	S	P	S		1635					O
150N068W09AAA2	MINNIE ANDERSON	30	32	D	1951		P	28		H	P	S		1637					N
150N068W11CBC	LEVORN GARNASS	42	30	B				23	7-64	U				1608					O
150N068W14CCD	U.S.G.S.	126		H	1965					U				1595			EG		N
150N068W14DCC	GINA SYLLING	68	30	B				14	9-64	U				1605					M
150N068W18BAA	E.P.ROSENDAHL	19	30	D	1958		8G	15		H	P	S		1576					N
150N068W20ADA	T.KALSRUD	95	24	B				35	7-64	H	J	S	5	1610	K				O
150N068W22ABA	G.BJERTNESS	280	6	C	1914					S	P	S	4	1597	K				N
150N068W23BBD	U.S.G.S.	75		H	1965					U				1585			DG		N
150N068W25CBD	GEORGESON BROS.	75	6	H	1963					H	S	S		1617					N
150N068W29DDD	U.S.G.S.	199		H	1966									1570			EG		N
150N068W31ADD	M.C.BERGRUD	13	36	D	1958		8G	13	7-64	S	P	S		1557					O
150N068W31CAC	P.J.BERGRUD	22	36	D	1905		G	21	10-46	U				1582					O
150N068W34ACC	A.LARSON	33	30	B	1946		S	27	7-64	H	J	S		1595					O
150N069W01CDC	C.B.FALEIDE	130	5	C	1920		S	20		H	P	S		1570					N
150N069W03ACA	ADOLPH FALEIDE	62	4	C			S	42		H	P	S	6	1548	P				N
150N069W03DBB	ADOLPH FALEIDE	27	4	C	1961		S	8	7-64	U	N			1555					O
150N069W04BAD	FRED JACOBSON	100	4	C		K3	F	20		H				1530			D		N
150N069W06BBB	CURTIS BERGRUD	55	4	C	1959	K3	F	15		H	S	S		1585		10			N
150N069W14ABB1	L.N.NELSON	13	36	D	1950			5	7-64	S	P	S		1575					O
150N069W14ABB2	FRED JACOBSON	65	4	C	1963		S	20		H	J	S	6	1575	P				N
150N069W14CDC	LEWIS AMBERS	27	30	B				14	9-64	U				1577					M
150N069W19BDA	O.E.AMBERS	50	24	B	1950			25		H	P	S		1606					N
150N069W20AAA	U.S.G.S.	221		H	1966									1587			DG		
150N069W21DBD	LEO HIBSCH	28	30	D	1910			13	7-64	S	P	S		1580					O
150N069W24DCC	U.S.G.S.	180		H	1967					U				1580			EG		N
150N069W27CDD	M.J.DAHL	13	48	D	1944			10	8-46	H				1549					O
150N069W29DDD	U.S.G.S.	90		H	1946									1555			G		
150N069W32AAA	U.S.G.S	42		H	1766					U				1560			DG		
150N069W32ADA	U.S.G.S.	50		H	1946					U				1544			G		

TABLE 1, CONTINUED.

LOCATION NUMBER	OWNER OR NAME	DEPTH OF WELL (FEET)	DIAM. OF WELL (INCHES)	METHOD DRILL-ED	DATE DRILL-ED	AQUIFER	LITHO-LOGY	DEPTH TO WATER BE-LOW LAND SURFACE (FEET)	DATE OF MEASURE-MENT	USE OF WATER	LIFT AND POWER	SPECIFIC CONDUCT-ANCE	ELEVATION OF LAND SURFACE	REMARKS (1)	(2)	(3)	(4)	(5)
150N069W32BCC	EUGENE RATZAK	18	36	D				11	7-64	S	P S		1580					O
150N069W32DAA	U.S.G.S.	80		H	1946					U			1548			G		
150N069W32DDD	CHRIS ELLINGSON	12		D			S	4	10-65	H	P 1	5	1545	K				O
150N069W33BBB	M.KITTLESON	16	48	D			S	11	7-64	H	P 6		1557					O
150N069W35BCB	JOE RISOVI JR.	43	24	D	1946			21	7-64	H	P S		1565					O
150N070W02AAC	H.P.GREENE	36	30	B	1936		S	14	6-46	U			1585					O
150N070W02BBB	M.E.ANDERSON	24	36	D	1933		S	9	6-46		P 5		1586					O
150N070W02CCD	H.M.OLSON	46	24	B			S	29	7-64	S	J S		1594					O
150N070W04BBB	U.S.G.S.	42		H	1965					U			1595			DG		
150N070W04BCC	GRANT HAKANSON	31	30	B	1929			18	6-46	S	P 5		1600					O
150N070W05ABB	M.BERGLUND	43		B				13					1597					O
150N070W06DDC	C.F.JOHNSON	41	18	B	1918			20	7-64	U		6	1604	K				O
150N070W07AAB	HILDUR FOSSEN	24	28	D			G	13	8-46	H		5	1615	P				O
150N070W08DCC	U.S.G.S.	115		H	1965					U			1570			EG		
150N070W09CDD	H.O.ANDERSON	38	24	B	1948			23	7-64	U	J 5		1600					O
150N070W11BBB	HELMER BACKLUND	30	24	B	1929		G	10	8-46	H	P		1584					O
150N070W17ADA	T.ELLINGSON	26		B	1909		G	23	8-46	H		6	1590	C				O
150N070W19CDC	JOHN RUGHNESS	41	30	B	1944			8	7-64	U			1594					M
150N070W19DAA	ALVIN OLSTAD	12	36	D				6	8-46	H			1592	P				O
150N070W20DAD1	HEIMDAL	15	8	D	1920		S	9	7-46	P	C F	4	1540	C			40	O
150N070W20DAD2	G.NORTHERN R.R.	12	60	D	1922		G	6	12-61	U	N		1540					
150N070W21AAC	MARIE GAARDER	26	48	D	1946			20	7-64	H	P S		1580					O
150N070W21DCA	AMES GEORGESON	25	36	D				19	8-46	S			1545	P				O
150N070W22CCB	U.S.G.S.	71		H	1946								1598			G		
150N070W22CCC	U.S.G.S.	295		H	1946					U			1575			G		
150N070W25ABB	ANTON RISOVI	63	48	D	1928		S	58	7-64	H	P S		1627					O
150N070W25CCB	NANNIE LARSON	9	36	D				4	6-65	U	P 1	5	1549	K				M
150N070W27ACB	O.C.JOHNSON EST	21	6	C				18	7-64	H	J 5		1550					O
150N070W27BBC	U.S.G.S.	212		H						U			1535			G		
150N070W27BCB	U.S.G.S.	30		H	1946					U			1535			G		
150N070W27BCC	U.S.G.S.	340		H	1946					U			1581			G		
150N070W28AAA	U.S.G.S.	40		H	1946					U			1570			G		
150N070W28ABB	U.S.G.S.	30		H	1946					U			1541			G		
150N070W28ADA	U.S.G.S.	45		H	1946					U			1560			G		N
150N070W28CCC	U.S.G.S.	347		H	1965					U			1595			EG		
150N070W29ADA	OSCAR FOSS	61	36	B	1922			5	7-64	S	P 6		1585					O
150N070W31CDD	U.S.G.S.	318	1	H	1966	QG52	9S	83	8-66	U	N	5	1600	C		EG		M
150N070W32ABB1	OBED LARSON	50	42	D	1915		G	32	8-46	S	J 5		1587					O
150N070W32ABB2	CAROLINE HUNT	5034		H	1954	K PM	V			U			1588			EG		
150N070W33ADD	U.S.G.S.	316		H	1946					U			1590			EG		
150N070W34BBB	U.S.G.S.	366		H	1946					U			1588			G		
150N070W34BCA	BERTHA IVERSON	165	4	C	1915		9S	23	9-46	U			1595	P				O
150N070W34CCC	U.S.G.S.	345		H	1946					U			1595			G		
150N070W35BBA	ARVIN KITTELSON	157	5	C	1962		G	24		H	J 5	5	1575	K				N
150N070W36AAA	U.S.G.S.	189		H	1966					U			1586			DG		
150N071W01ABB	ELMER HOVLAND	150	6	C	1912		G	70		H	P S		1645					N
150N071W01BDB	S.SANNAN	68	24	B	1931			56	8-46	H			1651					O
150N071W02CCC	JOHN JOHNSON	40	24	B	1928			13	8-46	H	P S		1595					O
150N071W04BAA	JOHN BUSS	170	4	C	1957		G	50		H	P 5	5	1600	C			43	N
150N071W04CCD	F.M.MELAND	180	6	C	1945			40		H	P		1595					O
150N071W04DDD	U.S.G.S.	267	1	H	1965	QG	8G	54	11-65	U	N	5	1580	C		EG	44	M
150N071W05DDD	G.HEILMAN	190	5	H	1952		S			H	P 5	5	1590	K				N

150N071W06AAA	LENA LEINTZ	12	36	D				8	9-64	U	P 6		1601					M
150N071W08BBB	U.S.G.S.	263		H	1965					U			1610			EG		
150N071W09BBD	GREAT NORTHERN	179	6	C	1950	QG	S	71	12-50	P	P 1		1597			D		O
150N071W09CCC	E.M.HOVLAND	180	2	C	1916		6S	60		U			1580					N
150N071W09DCB	E.M.HOVLAND	210	4	C	1959		G	60		H	P S	5	1593	K				N
150N071W10CDC	EDWARD SPECHT	200	2	C	1915		S	80		H			1595					N
150N071W11ABB	U.S.G.S.	231		H	1966					U			1600			EG		
150N071W12AAB	CAROLINE BENSON	73	22	B						H			1645					N
150N071W13AAA	N.A.SOLBERG	47		B	1910			40		H			1606					N
150N071W14ADA	E.J.KLEVEN	136	4	C	1943			24	7-64	U			1554					O
150N071W14DDD	E.J.KLEVEN	220	5	C	1915		G	75	8-46	H	P S		1592	P				O
150N071W15ADD	N.E.LILLEMON	170	4	C	1959			60		H	P S		1578					N
150N071W16CCC	U.S.G.S.	315		H	1966					U			1595			EG		
150N071W17CDB	FRANK WEIST	168	4	H	1965		S	90		H	S 5		1602			D		N
150N071W20AAD	S.KELLER	90	24	B				89		H	P S		1587					N
150N071W26ABB	U.S.G.S.	257	1	H	1965	QG	3G	63	10-65	U	N	5	1585	C		EG		M
150N071W26DDD	SELMER RODNE	165	5	C	1915		S	100		H	P S	5	1607	K				N
150N071W29AAB	U.S.G.S.	99	1	H	1966	QG	9S	7	8-66	U	N	5	1600	C		DG	46	M
150N071W29DDD	C.A.BUETHE	20	36	D				11	10-65	U	P 1	6	1610	K				O
150N071W32DDA	C.ALVESHERE	94	2	C	1960		S	20		S	P F		1608					N
150N072W01DDA	J.BERTSCH	124								H		5	1605	K				N
150N072W06ADD	FRANK HAGER	23	36	D	1935		S	20	7-64	H	P S	5	1604	K				O
150N072W06BBB	U.S.G.S.	210		H	1955					U			1610			G		
150N072W06DAD	U.S.G.S.	252		H	1965					U			1570			EG		
150N072W07CCC	U.S.G.S.	290		H	1955					U			1604			G		
150N072W11ADB	ALICE GOLDADE	210	4	H	1965	QG	6G	70		H	P 5	5	1620	K	8	D		N
150N072W11CCB	A.J.ZERR	19	24	D			2S	14	7-64	S	P S		1615					O
150N072W12DDA	U.S.G.S.	305		H	1965					U			1597			EG		
150N072W15AAA	U.S.G.S.	280		H	1967					U			1605			EG		N
150N072W15CCC	R.WIEDMEIER	165	4	C	1960					H	P S		1608					N
150N072W17DCC	BERTHA LIEBE	18	36	D			G	11	7-64	U	P S		1600					O
150N072W20BCC	U.S.G.S.	74		H	1965					U			1590			DG		N
150N072W21CDC	HARVEY	41	10	B	1928			11	7-65	U	N		1527					C
150N072W23AAA	U.S.B.R.	17						6	7-51	U	N		1604					O
150N072W23ADA	U.S.G.S.	113		H	1965					U			1520			DG		
150N072W23DDD	U.S.G.S.	221		H	1965					U			1605			EG		
150N072W24BBB	A.R.BENTZ	175	4	C						H	P 5	4	1600	K				N
150N072W27AAA1	F.L.MUSCHA	128	6	C	1964		G	30		H	P S	6	1597	K				N
150N072W27AAA2	F.L.MUSCHA	155	8	C						S	P 5	6	1597	K				N
150N072W28BAA	HARVEY	91	8	C	1962		6G	21	4-62	U			1526		104	D		O
150N072W28BAB1	HARVEY	36	28	C						P	T U		1527	C	460			N
150N072W28BAB2	HARVEY	65	16	R	1962		9S	8	7-62	P	T U	5	1527	C	600	D		O
150N072W28BAC	HARVEY	65		C	1960					U			1525			D		
150N072W28BAD	HARVEY	54	6	C	1960			8	7-62	U			1525		30	D		O
150N072W28BDB	HARVEY	45		C	1960					U			1525			D		
150N072W31	CONRAD KAFTON	195	2	H	1965					H						D		
150N072W31C	HARVEY	2235	1		1921	K PM	V	F	8-22	U			1600	P	1			
150N072W33DCD	ALFRED RUNNING	20	36	D			S	15	7-64	H	P S		1601					O
150N073W02BBA	U.S.B.R.	30		B	1955					U			1610			G		
150N073W02CCC	U.S.B.R.	14	3	B				7	7-51	U			1609					O
150N073W04BBB	GEORGE BENTZ	35	36	B			S	10		H	P 1	4	1666	C			51	N
150N073W05BBC	GEORGE BENDER	26	26	D	1900			16	7-46	U			1640					O
150N073W06CCC	JOSEPH ZERR	208	2	C	1945			50		H			1643					N
150N073W08ABA	ALFRED BENDER	30	36	D	1938			29	7-46	H			1643					O
150N073W08ABB	GEORGE BENDER	38	18	D				30	7-64	H	P 5	5	1625	K				O
150N073W09AAA	U.S.G.S.	347		H	1965					U			1615			EG		

TABLE 1, CONTINUED.

LOCATION NUMBER	OWNER OR NAME	DEPTH OF WELL (FEET)	DIAM. OF WELL (INCHES)	METHOD DRILLED	DATE DRILLED	AQUIFER	LITHOLOGY	DEPTH TO WATER BELOW LAND SURFACE (FEET)	DATE OF MEASUREMENT	USE OF WATER	LIFT AND POWER	SPECIFIC CONDUCTANCE	ELEVATION OF LAND SURFACE	REMARKS (1)	(2)	(3)	(4)	(5)
150N073W09DDC	I.G.BERGAN	18	48	D			G	10	7-64	H	P S		1612					O
150N073W12DCC	J.F.MEIER	22	36	D	1930			18		H			1610					N
150N073W13AAD	P.G.HAGER	25	36	D	1910			22	7-46	H			1612					O
150N073W13BBC	M.VOLK	24	48	D	1910			17	12-65	U		6	1607	K				M
150N073W13DDD	U.S.G.S.	53		H	1966					U			1600			DG		
150N073W14DDD	ALBERT ZERR	12	48	D	1941		S	8	7-46	U			1596					O
150N073W15CCC	U.S.G.S.	189		H	1966					U			1605			EG		N
150N073W19CAC	F.S.DOCKTER	190	3	C	1960			70		H	J 5		1620					N
150N073W19DDD	U.S.G.S.	120		H	1967					U			1607			DG		N
150N073W22CDD	FRANCIS GOLBERG	22	24	B			G	16	4-65	U	P 6		1611					M
150N073W26ABA	LEONARD SMESTAD	20	32	B	1963		S	14		S	P S		1605			D		N
150N073W26DCD	JOHN WIEST	16	48	D	1928			8	7-46				1596					O
150N073W31BDD	S.O.JOHNSON	100	5	C						H	P 6	5	1610	K				N
150N073W32ADB	A.CHRISTENSEN	34	30	D				15	7-64	S	J 5		1609					O
150N073W34ABA	ALFRED FAUL	19	36	D	1920		G	17	7-64	S	P S		1604					O

SUPPLEMENT TO TABLE 1

LOCATION NUMBER	OWNER OR NAME	DEPTH OF WELL (FEET)	DIAM. OF WELL (INCHES)	METHOD DRILLED	DATE DRILLED	AQUIFER	LITHOLOGY	DEPTH TO WATER BELOW LAND SURFACE (FEET)	DATE OF MEASUREMENT	USE OF WATER	LIFT AND POWER	SPECIFIC CONDUCTANCE	ELEVATION OF LAND SURFACE	REMARKS (1)	(2)	(3)	(4)	(5)
147N070W7BBB	U.S.G.S.	220		H	1967					U			1630			DG		N
148N068W17BCC	OTTO SEIBOLD	114	5	C			G	100		H		6	1583	P				N
148N068W19CBD	JOHN SIEBOLD	65	6	C			G	10		H		5	1585	P				N
149N072W36DAD	U.S.G.S.	220		H	1967					U			1615			EG		N
150N072W31DD	ALVIN MARTIN	178	3	C			G			C		5		P				N

TABLE 2.--RECORD OF SPRINGS

EXPLANATION

Use of water

H, domestic
S, stock
U, unused

Lithology

F, shale
G, gravel

Specific conductance (micromhos per centimeter at 25°C)

4, 501-1,000
5, 1,001-2,000
6, 2,001-5,000

Location number	Owner or name	Use of water	Lithology	Flow range	Conductance	Altitude	Remarks
145-69-5ddc	Robert Froelich	H	..	..	5	....	
145-72-8cac	G. P. Hoots	S	..	..	..	....	
145-72-17abb	J. Ryberg	H	G	< 1/8 gpm	5	....	Flows year round.
146-69-29ddd	E. L. Eaton	U	G	< 1/8 gpm	..	1730	
146-69-33aba	Francis Hammes	S	G	< 1/8 gpm	5	1660	
146-73-25cbd2	George Wilson	S	..	..	..	....	Flows year round.
147-73-2bbc	C. Schindler	S	..	..	..	1751	
147-73-3aac	C. Schindler	S	..	..	..	1750	
150-68-1ccc	Harold Johnson	U	G	1/8-1 gpm	4	1525	
150-68-11abb	A. L. Garnass	U	F	< 1/8 gpm	6	1500	
150-68-12bbb	L. B. Garnass	U	G	1/8-1 gpm	..	1525	Sheyenne terrace.

TABLE 3.--Water-level records of observation wells

Depth to water in feet below land surface

147-67-19cbc

Date	Water level	Date	Water level	Date	Water level
Dec. 29, 1965....	13.11	July 6, 1966....	10.67	Jan. 24, 1967....	12.17
Feb. 17, 1966....	13.24	Aug. 16..........	11.31	Feb. 15..........	12.38
Mar. 17..........	13.14	Sept. 13..........	11.65	Mar. 16..........	12.44
Apr. 14..........	12.95	Oct. 12..........	11.73	Apr. 20..........	11.17
May 26..........	11.25	Nov. 21..........	11.75	May 25..........	9.82
June 22..........	11.00	Dec. 20..........	11.86	June 22..........	10.56

(See Trapp, 1966, p. 95 for records from Sept. 1963 to Nov. 1965.)

145-68-10bcc

Date	Water level	Date	Water level	Date	Water level
Oct. 13, 1965....	10.62	June 22, 1966....	10.09	Jan. 24, 1967....	11.80
Nov. 29..........	10.59	July 7..........	10.05	Feb. 15..........	12.01
Dec. 29..........	10.62	Aug. 16..........	10.18	Mar. 16..........	12.17
Feb. 17, 1966....	11.23	Sept. 14..........	10.47	Apr. 20..........	11.63
Mar. 17..........	11.08	Oct. 12..........	10.72	May 25..........	11.05
Apr. 14..........	10.80	Nov. 21..........	11.10	June 22..........	10.83
May 26..........	10.41	Dec. 20..........	11.40		

145-68-12add

Date	Water level	Date	Water level	Date	Water level
Oct. 13, 1965....	10.16	June 22, 1966....	9.35	Jan. 24, 1967....	11.24
Nov. 29..........	10.34	July 7..........	9.54	Feb. 15..........	11.39
Dec. 29..........	10.44	Aug. 16..........	9.90	Mar. 16..........	11.27
Feb. 17, 1966....	10.76	Sept. 14..........	10.39	Apr. 20..........	10.82
Mar. 17..........	9.74	Oct. 12..........	10.78	May 25..........	10.05
Apr. 14..........	9.98	Nov. 21..........	10.96	June 22..........	10.03
May 26..........	9.30	Dec. 20..........	11.07		

145-69-26bbb

Date	Water level	Date	Water level	Date	Water level
Oct. 12, 1965....	42.80	June 22, 1966....	41.73	Jan. 24, 1967....	41.48
Nov. 29..........	42.40	July 7..........	41.69	Feb. 15..........	41.24
Dec. 29..........	42.10	Aug. 16..........	41.74	Mar. 16..........	41.50
Feb. 17, 1966....	41.90	Sept. 14..........	41.83	Apr. 20..........	41.27
Mar. 17..........	41.68	Oct. 12..........	41.81	May 25..........	40.92
Apr. 14..........	41.80	Nov. 21..........	41.55	June 22..........	41.32
May 26..........	41.70	Dec. 20..........	41.55		

145-70-23bbb

Date	Water level	Date	Water level	Date	Water level
Sept. 15, 1964....	5.76	Aug. 17, 1965....	3.66	June 22, 1966....	3.70
Oct. 22..........	5.50	Sept. 15..........	3.18	July 7..........	3.60
Nov. 12..........	5.43	Nov. 2..........	3.12	Aug. 16..........	5.09
Mar. 26, 1965....	Frozen	Dec. 29..........	4.45	Sept. 14..........	5.03
Apr. 26..........	6.76	Feb. 17, 1966....	Frozen	Oct. 12..........	5.01
May 17..........	5.75	Apr. 14..........	6.00	Nov. 22..........	4.92
June 24..........	5.24	May 26..........	3.78	Dec. 20..........	5.27
July 20..........	4.52				

Depth to water in feet below land surface

145-72-10aaa

Date	Water level	Date	Water level	Date	Water level
Nov. 23, 1965....	36.63	June 21, 1966....	13.68	Jan. 23, 1967....	12.22
Dec. 28..........	21.80	July 5..........	13.20	Feb. 15..........	12.05
Jan. 25, 1966....	19.15	Aug. 16..........	13.00	Mar. 15..........	12.03
Feb. 16..........	17.80	Sept. 12..........	12.89	Apr. 20..........	11.75
Mar. 16..........	16.49	Oct. 11..........	12.84	May 24..........	11.47
Apr. 13..........	15.26	Nov. 21..........	12.55	June 21..........	11.98
May 25..........	14.20	Dec. 19..........	12.40		

145-73-24ddd

Date	Water level	Date	Water level	Date	Water level
Sept. 28, 1964....	8.93	Aug. 26, 1965....	7.17	Aug. 16, 1966....	7.70
Oct. 22..........	8.17	Sept. 14..........	6.94	Sept. 12..........	8.44
Nov. 11..........	8.15	Nov. 1..........	6.43	Oct. 11..........	9.05
Dec. 15..........	8.43	Dec. 28..........	Frozen	Nov. 21..........	9.17
Jan. 20, 1965....	9.01	Jan. 25, 1966....	Frozen	Dec. 19..........	9.35
Feb. 18..........	9.37	Feb. 16..........	Frozen	Jan. 23, 1967....	9.74
Mar. 25..........	Frozen	Mar. 16..........	Frozen	Feb. 15..........	Frozen
Apr. 26..........	6.12	Apr. 13..........	Frozen	Mar. 15..........	Frozen
May 17..........	6.09	May 25..........	6.03	Apr. 20..........	7.15
June 24..........	6.93	June 21..........	6.27	May 24..........	6.15
July 19..........	6.42	July 5..........	6.08	June 21..........	7.05
Aug. 18..........	6.90				

146-68-12bcb

Date	Water level	Date	Water level	Date	Water level
Sept. 24, 1964....	16.10	Sept. 15, 1965....	13.99	Sept. 13, 1966....	9.73
Oct. 21..........	17.32	Nov. 2..........	13.05	Oct. 12..........	10.42
Nov. 12..........	17.33	Dec. 29..........	12.47	Nov. 21..........	10.85
Mar. 26, 1965....	17.40	Feb. 17, 1966....	12.62	Dec. 20..........	11.05
Apr. 26..........	17.37	Apr. 14..........	11.54	Jan. 24, 1967....	11.39
May 17..........	17.32	May 26..........	9.55	Mar. 16..........	11.84
June 24..........	17.23	June 22..........	8.95	Apr. 20..........	10.30
July 20..........	15.43	July 6..........	8.70	May 25..........	8.05
Aug. 17..........	14.45	Aug. 16..........	9.15	June 22..........	8.24
Aug. 27..........	14.28				

146-68-31bab

Date	Water level	Date	Water level	Date	Water level
Oct. 2, 1964....	17.89	Aug. 17, 1965....	19.91	June 22, 1966....	15.93
22..........	21.03	27..........	19.66	July 6..........	15.80
Nov. 12..........	20.85	Sept. 15..........	19.43	Aug. 16..........	16.10
Mar. 26, 1965....	21.38	Nov. 2..........	18.26	Sept. 13..........	16.65
Apr. 26..........	21.38	Feb. 17, 1966....	17.89	Oct. 12..........	16.92
May 17..........	21.05	Mar. 17..........	17.83	Nov. 21..........	17.08
June 24..........	20.65	Apr. 14..........	18.30	Dec. 20..........	17.25
July 20..........	20.37	May 26..........	17.30		

Depth to water in feet below land surface

Date	Water level	Date	Water level	Date	Water level
146-69-9bab					
Sept. 24, 1964....	15.30	Aug. 27, 1965....	13.52	Aug. 16, 1966....	7.25
Oct. 22..........	15.45	Sept. 15..........	13.27	Sept. 13..........	7.95
Nov. 12..........	15.18	Nov. 2..........	11.62	Oct. 12..........	8.52
Mar. 26, 1965....	Frozen	Dec. 29..........	10.80	Nov. 21..........	8.95
Apr. 26..........	15.70	Feb. 17, 1966....	Frozen	Dec. 20..........	9.36
May 17..........	15.44	Apr. 14..........	11.10	Feb. 15, 1967....	Frozen
June 24..........	14.83	May 26..........	8.85	Apr. 20..........	10.19
July 20..........	14.06	June 22..........	7.38	May 25..........	6.60
Aug. 17..........	13.55	July 6..........	6.70	June 22..........	6.80
146-69-32daa					
Oct. 2, 1964....	16.54	July 20, 1965....	16.04	May 26, 1966....	12.07
22..........	16.89	Aug. 17..........	15.53	June 22..........	11.44
Nov. 12..........	16.76	27..........	15.39	July 7..........	11.22
Jan. 21, 1965....	16.55	Sept. 15..........	15.00	Aug. 16..........	10.80
Feb. 19..........	16.60	Nov. 2..........	13.96	Sept. 14..........	11.48
Mar. 26..........	16.83	Dec. 29..........	12.90	Oct. 12..........	12.06
Apr. 26..........	17.03	Feb. 17, 1966....	12.91	Nov. 22..........	12.63
May 17..........	16.77	Mar. 17..........	12.85	Dec. 20..........	12.97
June 24..........	16.40	Apr. 14..........	13.31		
146-70-13ccc1					
Aug. 16, 1966....	4.30	Dec. 20, 1966....	5.01	Apr. 20, 1967....	2.34
Sept. 14..........	4.86	Jan. 24, 1967....	5.09	May 25..........	2.38
Oct. 12..........	4.95	Feb. 15..........	5.00	June 22..........	3.19
Nov. 22..........	4.89	Mar. 16..........	4.68		
146-70-13ccc2					
Aug. 16, 1966....	7.14	Dec. 20, 1966....	8.04	Apr. 20, 1967....	5.54
Sept. 14..........	7.98	Jan. 4, 1967....	8.05	May 25..........	5.55
Oct. 12..........	8.20	Feb. 15..........	8.16	June 22..........	7.38
Nov. 22..........	7.68	Mar. 16..........	7.87		
146-70-17bab					
Sept. 23, 1964....	9.85	July 20, 1965....	9.32	June 21, 1966....	7.67
Oct. 22..........	9.94	Aug. 17..........	8.39	July 5..........	7.87
Nov. 12..........	10.00	27..........	8.65	Aug. 15..........	8.92
Jan. 21, 1965....	10.33	Nov. 2..........	8.13	Sept. 14..........	9.29
Feb. 19..........	10.39	Dec. 29..........	Frozen	Oct. 11..........	9.24
Mar. 25..........	Frozen	Feb. 17, 1966....	Frozen	Nov. 21..........	9.37
Apr. 26..........	9.80	Mar. 16..........	Frozen	Dec. 19..........	9.40
May 17..........	9.61	Apr. 13..........	Frozen	Jan. 23, 1967....	Frozen
June 23..........	9.56	May 25..........	7.80		

Depth to water in feet below land surface

146-71-4aaa

Date	Water level	Date	Water level	Date	Water level
Nov. 22, 1965....	2.64	June 21, 1966....	2.55	Dec. 19, 1966....	3.35
Dec. 29..........	2.80	29..........	2.75	Jan. 23, 1967....	3.78
Jan. 25, 1966....	Frozen	July 5..........	2.13	Feb. 15..........	3.85
Feb. 16..........	Frozen	Aug. 15..........	3.16	Mar. 15..........	3.57
Mar. 16..........	Frozen	Sept. 12..........	3.55	Apr. 20..........	2.29
Apr. 13..........	Frozen	Oct. 11..........	3.74	May 24..........	1.70
May 25..........	Frozen	Nov. 21..........	3.05	June 21..........	2.35
June 2..........	2.40				

146-72-4ccc1

Date	Water level	Date	Water level	Date	Water level
Sept. 23, 1964....	8.82	Sept. 14, 1965....	4.69	June 21, 1966....	3.00
Oct. 22..........	8.28	Nov. 1..........	3.97	July 5..........	2.95
Nov. 11..........	8.53	Dec. 28..........	5.22	Aug. 15..........	5.47
Dec. 15..........	9.08	Jan. 25, 1966....	6.64	Sept. 12..........	6.95
Apr. 26, 1965....	8.63	Feb. 16..........	7.56	Oct. 11..........	8.00
May 17..........	6.96	Mar. 16..........	7.27	Nov. 21..........	8.58
June 23..........	5.81	Apr. 13..........	6.60	Dec. 19..........	8.77
Aug. 18..........	4.31	May 25..........	2.86	Jan. 23, 1967....	9.15
26..........	4.63				

146-72-4ccc2

Date	Water level	Date	Water level	Date	Water level
Sept. 23, 1964....	9.74	Nov. 1, 1965....	3.99	Sept. 12, 1966....	6.67
Oct. 22..........	8.36	Dec. 28..........	5.15	Oct. 11..........	7.90
Nov. 11..........	8.53	Jan. 25, 1966....	6.62	Nov. 21..........	8.40
Dec. 15..........	9.05	Feb. 16..........	7.54	Dec. 19..........	8.68
Apr. 26, 1965....	8.29	Mar. 16..........	7.99	Jan. 23, 1967....	9.04
May 17..........	6.62	Apr. 13..........	6.14	Mar. 15..........	9.35
June 23..........	5.72	May 25..........	2.65	Apr. 20..........	6.00
Aug. 18..........	4.49	June 21..........	2.99	May 24..........	2.58
26..........	4.80	July 5..........	2.68	June 21..........	3.92
Sept. 14..........	4.87	Aug. 15..........	4.97		

146-73-10cbb
Measurement in gallons per minute

Sept. 22, 1964....	0.13	Aug. 18, 1965....	0.10	Aug. 15, 1966....	0.03
Oct. 22..........	.11	26..........	.06	Sept. 12..........	.03
Nov. 11..........	.11	Sept. 14..........	.06	Oct. 10..........	.03
Apr. 26, 1965....	.11	Nov. 1..........	.06	Nov. 18..........	.02
May 17..........	.10	May 20, 1966....	.04	Dec. 19..........	.02
June 23..........	.10	June 21..........	.04	Apr. 26, 1967....	.02
July 19..........	.10	July 5..........	.04		

Depth to water in feet below land surface

147-68-1ddd

Date	Water level	Date	Water level	Date	Water level
Apr. 2, 1964	7.70	Mar. 26, 1965	8.93	June 22, 1966	3.95
May 20	6.48	Apr. 26	6.48	July 6	3.50
June 24	2.44	May 17	6.55	Aug. 16	5.55
July 24	5.35	June 24	7.32	Sept. 13	6.05
Aug. 17	5.27	July 20	6.69	Oct. 12	6.39
Sept. 23	5.22	Aug. 17	4.65	Nov. 21	7.06
24	5.45	27	5.12	Dec. 20	7.79
Oct. 15	4.58	Sept. 15	5.09	Jan. 24, 1967	8.67
21	5.08	Nov. 2	3.20	Feb. 15	9.25
Nov. 12	5.44	Dec. 29	5.22	Mar. 16	9.83
20	5.54	Feb. 17, 1966	7.22	Apr. 20	0.96
Dec. 22	6.39	Mar. 17	7.13	May 25	2.82
Jan. 21, 1965	7.53	Apr. 14	2.67	June 22	4.80
Feb. 19	8.31	May 26	3.45		

147-68-10add

Date	Water level	Date	Water level	Date	Water level
Oct. 14, 1965	9.43	June 22, 1966	8.83	Jan. 24, 1967	8.99
Nov. 29	9.44	July 6	8.72	Feb. 15	9.15
Dec. 29	9.31	Aug. 16	8.67	Mar. 16	9.23
Feb. 17, 1966	9.54	Sept. 13	8.80	Apr. 20	8.10
Mar. 17	9.48	Oct. 12	8.80	May 25	8.40
Apr. 14	9.45	Nov. 21	8.80	June 22	8.35
May 26	9.05	Dec. 20	8.85		

147-68-22aaa1

Date	Water level	Date	Water level	Date	Water level
Sept. 24, 1964	12.20	Aug. 27, 1965	7.42	Sept. 13, 1966	7.44
Oct. 21	12.53	Sept. 15	7.00	Oct. 12	8.39
Nov. 12	12.22	Nov. 1	5.04	Nov. 21	8.52
Jan. 21, 1965	13.13	Dec. 29	6.42	Dec. 20	9.34
Feb. 19	14.21	Feb. 17, 1966	9.38	Jan. 24, 1967	10.75
Mar. 26	15.21	Mar. 17	10.12	Feb. 15	11.50
Apr. 26	15.55	Apr. 14	4.73	Mar. 16	12.26
May 17	14.11	May 26	3.20	Apr. 20	8.80
June 24	10.90	June 22	3.53	May 25	4.42
July 20	8.52	July 6	3.39	June 22	4.92
Aug. 17	7.01	Aug. 16	6.30		

147-70-3baa

Date	Water level	Date	Water level	Date	Water level
Sept. 23, 1964	14.33	Feb. 18, 1965	15.33	June 23, 1965	13.64
Oct. 21	14.11	Mar. 25	16.05	July 19	13.33
Nov. 12	13.89	Apr. 26	15.69	Aug. 17	12.64
Jan. 21, 1965	14.70	May 17	15.37	27	12.70
				Well destroyed	

Depth to water in feet below land surface

147-70-15ccc

Date	Water level	Date	Water level	Date	Water level
Sept. 23, 1964....	8.05	July 19, 1965....	6.84	May 26, 1966....	4.04
Oct. 20..........	8.31	Aug. 17..........	6.17	June 21..........	4.74
Nov. 12..........	8.35	27..........	6.11	July 5..........	4.16
Jan. 21, 1965....	9.02	Sept. 15..........	4.74	Aug. 15..........	6.23
Feb. 18..........	9.52	Nov. 1..........	4.48	Sept. 13..........	7.30
Mar. 25..........	8.50	Dec. 29..........	5.34	Oct. 11..........	8.10
Apr. 26..........	5.73	Feb. 17, 1966....	6.82	Nov. 21..........	8.20
May 17..........	5.72	Mar. 17..........	6.30	Dec. 19..........	8.39
June 23..........	7.01	Apr. 13..........	5.30	Jan. 23, 1967....	8.63

147-70-18ccc

Date	Water level	Date	Water level	Date	Water level
Oct. 20, 1964....	8.78	Sept. 15, 1965....	8.25	Sept. 13, 1966....	8.28
Nov. 12..........	8.89	Nov. 1..........	7.25	Oct. 11..........	8.68
Jan. 21, 1965....	7.88	Dec. 29..........	7.54	Nov. 21..........	8.75
Apr. 26..........	8.73	Mar. 23, 1966....	8.61	Dec. 19..........	9.00
May 17..........	7.44	Apr. 13..........	8.24	Jan. 23, 1967....	9.61
June 23..........	7.69	May 26..........	6.27	Mar. 15..........	9.69
July 19..........	7.48	June 21..........	6.65	Apr. 20..........	8.46
Aug. 17..........	7.60	July 5..........	6.43	May 24..........	6.91
27..........	7.75	Aug. 15..........	7.36	June 21..........	7.22

147-70-22bbb

Date	Water level	Date	Water level	Date	Water level
Oct. 20, 1964....	5.75	Sept. 15, 1965....	3.80	Sept. 13, 1966....	6.44
Nov. 12..........	6.35	Nov. 1..........	4.05	Oct. 11..........	7.76
Feb. 18, 1965....	8.52	Dec. 29..........	5.22	Nov. 21..........	8.00
Mar. 25..........	4.29	Feb. 17, 1966....	7.08	Dec. 19..........	8.35
Apr. 26..........	3.05	Mar. 17..........	5.00	Jan. 23, 1967....	8.83
May 17..........	3.66	Apr. 13..........	2.68	Feb. 15..........	9.04
June 23..........	5.46	May 26..........	3.25	Mar. 15..........	2.60
July 19..........	5.37	June 21..........	3.97	Apr. 20..........	2.37
Aug. 17..........	3.84	July 5..........	3.05	May 24..........	3.39
27..........	3.87	Aug. 15..........	5.63	June 21..........	5.05

147-72-3bbb1

Date	Water level	Date	Water level	Date	Water level
Sept. 23, 1964....	10.52	Nov. 1, 1965....	10.09	Sept. 13, 1966....	9.70
Oct. 20..........	9.65	Dec. 28..........	10.37	Oct. 11..........	9.93
Nov. 11..........	9.70	Jan. 25, 1966....	Plugged	Nov. 18..........	10.55
Dec. 15..........	9.86	Feb. 16..........	11.93	Dec. 19..........	10.60
Apr. 26, 1965....	11.75	Mar. 16..........	12.37	Jan. 23, 1967....	11.52
May 17..........	11.37	Apr. 13..........	12.34	Feb. 15..........	10.89
July 19..........	9.69	May 25..........	9.81	Mar. 15..........	12.08
Aug. 18..........	10.52	June 21..........	8.96	Apr. 19..........	11.76
26..........	10.60	July 5..........	8.75	May 24..........	9.48
Sept. 14..........	10.95	Aug. 15..........	8.87	June 21..........	9.27

Depth to water in feet below land surface

147-72-6bbb					
Date	Water level	Date	Water level	Date	Water level
Aug. 15, 1966....	6.80	Dec. 19, 1966....	7.07	Apr. 19, 1967....	6.90
Sept. 13..........	7.00	Jan. 23, 1967....	7.09	May 24..........	6.70
Oct. 11..........	7.03	Feb. 15..........	7.07	June 21..........	6.73
Nov. 18..........	7.10	Mar. 15..........	7.20		

148-68-3ddd					
Oct. 21, 1964....	6.86	Nov. 1, 1965....	2.37	Sept. 13, 1966....	6.32
Nov. 12..........	7.50	Dec. 29..........	5.84	Oct. 12..........	6.65
Mar. 20, 1965....	Frozen	Feb. 16, 1966....	6.35	Nov. 21..........	6.72
Apr. 26..........	4.85	Mar. 17..........	6.63	Dec. 20..........	7.42
May 17..........	4.69	Apr. 14..........	4.25	Jan. 24, 1967....	8.29
June 23..........	6.21	May 26..........	2.29	Feb. 16..........	8.66
July 20..........	.51	June 22..........	2.76	Mar. 16..........	9.02
Aug. 17..........	3.34	28..........	3.10	Apr. 20..........	2.15
27..........	2.94	July 6..........	2.94	May 25..........	2.40
Sept. 15..........	2.30	Aug. 16..........	5.40	June 21..........	3.50

148-69-10dad					
Sept. 17, 1964....	3.09	July 19, 1965....	2.57	May 26, 1966....	+ .30
Oct. 21..........	2.66	Aug. 17..........	.68	June 22..........	1.08
Nov. 12..........	2.73	26..........	+ .33	July 5..........	+ .30
Jan. 21, 1965....	5.32	Sept. 15..........	+ .44	Aug. 16..........	2.76
Feb. 19..........	6.40	Nov. 1..........	+ .41	Sept. 13..........	4.21
Mar. 26..........	Frozen	Dec. 29..........	Frozen	Oct. 12..........	5.00
Apr. 27..........	+ .40	Feb. 16, 1966....	Frozen	Nov. 21..........	5.29
May 17..........	1.33	Mar. 17..........	Frozen	Dec. 20..........	6.15
June 23..........	3.29	Apr. 14..........	+ .72		

148-69-20ccb					
Sept. 17, 1964....	18.32	Apr. 26, 1965....	18.00	Sept. 15, 1965....	17.98
Oct. 21..........	18.26	May 17..........	18.07	Nov. 1..........	17.84
Nov. 12..........	18.19	June 23..........	18.28	Dec. 29..........	17.69
Jan. 21, 1965....	17.94	July 19..........	18.30	Feb. 16, 1966....	17.60
Feb. 18..........	18.05	Aug. 17..........	18.12	May 26..........	17.58
Mar. 25..........	17.99	27..........	18.08	Plugged	

148-71-6ada					
June 29, 1965....	12.36	Mar. 16, 1966....	13.57	Nov. 18, 1966....	14.05
July 19..........	12.28	Apr. 13..........	12.30	Dec. 19..........	14.03
Aug. 17..........	11.77	May 25..........	10.50	Jan. 23, 1967....	14.45
26..........	11.86	June 21..........	10.66	Feb. 15..........	14.56
Sept. 15..........	12.10	July 5..........	10.98	Mar. 15..........	14.71
Nov. 1..........	10.93	Aug. 15..........	12.29	Apr. 19..........	12.14
Dec. 29..........	11.50	Sept. 13..........	13.20	May 24..........	10.48
Jan. 25, 1966....	12.74	Oct. 11..........	13.73	June 21..........	11.52
Feb. 16..........	13.36				

Depth to water in feet below land surface

148-71-24ddd

Date	Water level	Date	Water level	Date	Water level
Nov. 17, 1966....	10.15	Feb. 15, 1967....	11.11	May 24, 1967....	11.69
Dec. 19..........	10.30	Mar. 15..........	11.65	June 21..........	11.21
Jan. 23, 1967....	10.77	Apr. 20..........	11.99		

148-71-26dcc

Date	Water level	Date	Water level	Date	Water level
Sept. 17, 1964....	11.74	June 23, 1965....	10.27	Dec. 29, 1965....	Frozen
Oct. 21..........	11.54	July 19..........	10.14	Jan. 25, 1966....	Frozen
Nov. 12..........	11.22	Aug. 17..........	10.09	Feb. 16..........	Frozen
Mar. 25, 1965....	12.24	27..........	10.10	Apr. 13..........	10.35
Apr. 26..........	12.03	Sept. 15..........	10.19	June 21..........	8.30
May 17..........	11.56	Nov. 1..........	10.29	Well destroyed	

148-71-28aaa

Date	Water level	Date	Water level	Date	Water level
Sept. 17, 1964....	10.40	Nov. 1, 1965....	8.29	Sept. 13, 1966....	8.93
Oct. 21..........	9.84	Dec. 29..........	9.13	Oct. 11..........	9.50
Nov. 12..........	9.84	Jan. 25, 1966....	10.28	Nov. 18..........	10.10
Mar. 25, 1965....	12.81	Feb. 16..........	11.24	Dec. 19..........	10.46
Apr. 26..........	12.27	Mar. 16..........	11.66	Jan. 23, 1967....	11.50
May 17..........	10.21	Apr. 13..........	11.23	Feb. 15..........	12.15
June 23..........	8.77	May 25..........	7.02	Mar. 15..........	13.10
July 19..........	8.76	June 21..........	6.86	Apr. 19..........	12.00
Aug. 17..........	9.68	July 5..........	6.88	May 24..........	7.64
27..........	10.26	Aug. 15..........	7.93	June 21..........	7.43
Sept. 15..........	10.42				

148-72-9ccc

Date	Water level	Date	Water level	Date	Water level
Aug. 15, 1966....	5.07	Dec. 19, 1966....	6.38	Apr. 19, 1967....	5.26
Sept. 13..........	6.05	Jan. 23, 1967....	7.14	May 24..........	4.78
Oct. 11..........	6.05	Feb. 15..........	7.20	June 21..........	5.60
Nov. 18..........	6.32	Mar. 15..........	7.06		

148-72-15aba

Date	Water level	Date	Water level	Date	Water level
Nov. 8, 1965....	3.19	May 25, 1966....	3.07	Dec. 19, 1966....	3.69
22..........	3.29	June 21..........	3.19	Jan. 23, 1967....	3.82
Dec. 28..........	3.42	July 5..........	2.60	Feb. 15..........	3.70
Jan. 25, 1966....	Frozen	Aug. 15..........	3.63	Mar. 15..........	3.33
Feb. 16..........	Frozen	Sept. 13..........	3.90	Apr. 19..........	2.64
Mar. 16..........	Frozen	Oct. 11..........	3.90	May 24..........	2.20
Apr. 13..........	Frozen	Nov. 18..........	3.69	June 21..........	3.62

148-72-34dad

Date	Water level	Date	Water level	Date	Water level
Aug. 15, 1966....	11.78	Dec. 19, 1966....	12.25	Apr. 19, 1967....	11.35
Sept. 13..........	12.17	Jan. 23, 1967....	12.32	May 24..........	10.12
Oct. 11..........	12.20	Feb. 15..........	12.15	June 21..........	11.65
Nov. 18..........	12.25	Mar. 15..........	11.95		

Depth to water in feet below land surface

148-73-14add

Date	Water level	Date	Water level	Date	Water level
Dec. 28, 1965	3.10	June 21, 1966	2.40	Jan. 23, 1967	5.03
Jan. 25, 1966	4.11	July 5	1.06	Feb. 15	5.05
Feb. 16	Frozen	Aug. 15	2.60	Mar. 15	4.78
Mar. 16	Frozen	Sept. 13	4.15	Apr. 19	Frozen
Apr. 13	Frozen	Oct. 11	4.50	May 24	1.80
May 25	Frozen	Nov. 18	4.45	June 21	3.22
June 1	2.50	Dec. 19	4.59		

148-73-35daa

Date	Water level	Date	Water level	Date	Water level
Mar. 16, 1966	1.06	Sept. 13, 1966	0.87	Apr. 19, 1967	Frozen
Apr. 13	1.07	Oct. 11	.84	May 9	0.55
May 25	.80	Nov. 18	Frozen	16	.61
June 21	.80	Dec. 19	Frozen	24	.58
July 5	.65	Feb. 16, 1967	Frozen	June 21	.50
Aug. 15	.68	Mar. 15	Frozen		

149-68-20dad

Date	Water level	Date	Water level	Date	Water level
Sept. 17, 1964	33.01	Aug. 17, 1965	31.99	May 26, 1967	30.90
Oct. 21	32.93	26	31.84	June 22	30.89
Nov. 12	32.77	Sept. 15	31.67	July 6	30.89
Jan. 20, 1965	31.65	Nov. 2	31.24	Aug. 16	30.95
Apr. 26	32.85	Dec. 28	30.98	Sept. 13	31.12
May 17	32.58	Feb. 16, 1966	31.21	Oct. 12	31.19
June 23	32.63	Mar. 17	31.08	Nov. 21	31.39
July 20	32.22	Apr. 14	31.19	Dec. 20	31.53

149-68-21cbc

Date	Water level	Date	Water level	Date	Water level
Oct. 14, 1965	29.68	June 22, 1966	29.43	Jan. 24, 1967	30.18
Nov. 2	29.69	July 6	29.42	Feb. 16	30.30
Dec. 29	29.48	Aug. 16	29.60	Mar. 15	30.50
Feb. 16, 1966	29.75	Sept. 13	29.65	Apr. 20	29.99
Mar. 17	29.66	Oct. 11	29.79	May 25	29.80
Apr. 14	29.75	Nov. 21	29.95	June 21	29.77
May 25	29.48	Dec. 20	30.07		

149-69-18adb1

Date	Water level	Date	Water level	Date	Water level
Sept. 18, 1964	10.33	July 19, 1965	10.12	June 21, 1966	4.80
Oct. 21	10.35	Aug. 17	7.80	July 6	4.89
Nov. 12	10.44	Sept. 15	7.03	Aug. 16	6.83
Mar. 25, 1965	11.16	Nov. 1	5.46	Sept. 13	7.95
Apr. 26	10.52	Dec. 29	6.24	Oct. 11	8.44
May 17	10.47	Apr. 13, 1966	6.72	Nov. 21	8.79
June 23	10.47	May 25	4.65	Dec. 20	9.00

Depth to water in feet below land surface

149-69-24bcc

Date	Water level	Date	Water level	Date	Water level
Oct. 20, 1965....	38.75	June 22, 1966....	38.42	Jan. 24, 1967....	38.74
Nov. 29..........	38.73	July 6..........	38.58	Feb. 16..........	38.85
Dec. 29..........	38.37	Aug. 16..........	38.63	Mar. 15..........	39.09
Feb. 16, 1966....	38.91	Sept. 13..........	38.83	Apr. 20..........	38.20
Mar. 17..........	38.73	Oct. 12..........	38.85	May 25..........	38.03
Apr. 14..........	38.89	Nov. 21..........	38.24	June 21..........	38.07
May 25..........	38.55	Dec. 20..........	38.45		

149-69-28ddc

Date	Water level	Date	Water level	Date	Water level
Sept. 18, 1964....	5.89	Sept. 15, 1965....	1.93	July 6, 1966....	2.36
Oct. 21..........	5.52	Nov. 1..........	2.39	Aug. 16..........	4.65
Nov. 12..........	5.52	Dec. 28..........	Frozen	Sept. 13..........	6.18
Apr. 20, 1965....	1.95	Feb. 16, 1966....	Frozen	Oct. 12..........	6.88
May 17..........	2.20	Apr. 13..........	2.30	Nov. 21..........	7.10
June 23..........	4.71	May 26..........	2.20	Dec. 20..........	7.44
July 19..........	3.66	June 22..........	2.55	Jan. 24, 1967....	Frozen
Aug. 17..........	2.74				

149-70-2aaa

Date	Water level	Date	Water level	Date	Water level
Oct. 21, 1965....	57.79	June 21, 1966....	57.33	Jan. 23, 1967....	56.40
Nov. 1..........	57.68	July 6..........	57.38	Feb. 16..........	57.28
Dec. 29..........	57.29	Aug. 16..........	57.28	Mar. 15..........	57.45
Jan. 25, 1966....	57.41	Sept. 13..........	57.35	Apr. 19..........	57.06
Feb. 16..........	57.53	Oct. 11..........	57.12	May 25..........	57.00
Apr. 13..........	57.58	Nov. 21..........	56.87	June 21..........	57.00
May 25..........	57.49	Dec. 20..........	56.98		

149-70-9daa1

Date	Water level	Date	Water level	Date	Water level
May 17, 1966....	65.89	Oct. 11, 1966....	66.02	Feb. 16, 1967....	66.35
June 21..........	66.00	Nov. 11..........	65.90	Mar. 15..........	66.65
July 6..........	66.26	21..........	65.79	Apr. 19..........	66.00
Aug. 15..........	65.98	Dec. 20..........	65.83	May 25..........	65.89
Sept. 13..........	66.34	Jan. 23, 1967....	66.33	June 21..........	66.00

149-70-9daa2

Date	Water level	Date	Water level	Date	Water level
May 17, 1966....	65.93	Sept. 13, 1966....	66.30	Jan. 23, 1967....	65.28
June 21..........	66.05	Oct. 11..........	66.03	Mar. 15..........	67.15
July 6..........	66.26	Nov. 11..........	65.95	May 25..........	65.88
Aug. 15..........	66.98	Dec. 20..........	65.85		

Depth to water in feet below land surface

149-70-26cdb

Date	Water level	Date	Water level	Date	Water level
Sept. 18, 1964....	11.47	Aug. 26, 1965....	7.95	June 21, 1966....	5.50
Oct. 21..........	11.54	Sept. 15..........	7.80	July 6..........	6.25
Nov. 12..........	11.47	Nov. 1..........	6.40	Aug. 15..........	7.60
Mar. 25, 1965....	11.65	Dec. 29..........	6.70	Sept. 13..........	8.40
Apr. 26..........	8.10	Feb. 16, 1966....	Frozen	Oct. 11..........	8.89
May 17..........	7.65	Mar. 16..........	Frozen	Nov. 21..........	9.10
June 23..........	8.14	Apr. 13..........	4.45	Dec. 20..........	9.20
July 19..........	8.36	May 25..........	4.30	Jan. 23..........	Frozen
Aug. 17..........	7.87				

149-71-9ddd2

Date	Water level	Date	Water level	Date	Water level
July 14, 1964....	17.74	Nov. 1, 1965....	14.83	Sept. 13, 1966....	12.32
Oct. 21..........	16.83	Dec. 29..........	14.95	Oct. 11..........	13.08
Nov. 11..........	16.84	Jan. 25, 1966....	15.36	Nov. 18..........	13.85
Jan. 20, 1965....	17.42	Feb. 16..........	15.43	Dec. 19..........	14.05
Apr. 26..........	17.75	Mar. 16..........	15.24	Jan. 23, 1967....	14.45
May 17..........	16.69	Apr. 13..........	13.96	Feb. 15..........	14.76
June 23..........	15.62	May 25..........	12.69	Mar. 15..........	15.15
July 19..........	15.25	June 21..........	11.70	Apr. 19..........	14.96
Aug. 18..........	14.48	July 5..........	11.53	May 24..........	12.89
26..........	14.29	Aug. 15..........	10.62	June 21..........	11.68
Sept. 15..........	14.45				

149-71-19cdd

Date	Water level	Date	Water level	Date	Water level
Aug. 15, 1966....	6.08	Dec. 19, 1966....	7.28	Apr. 19, 1967....	6.41
Sept. 13..........	6.84	Jan. 23, 1967....	7.68	May 24..........	4.75
Oct. 11..........	7.10	Feb. 15..........	7.78	June 21..........	5.33
Nov. 18..........	7.27	Mar. 15..........	7.70		

149-71-22bcb

Date	Water level	Date	Water level	Date	Water level
Sept. 16, 1964....	30.12	Sept. 15, 1965....	29.68	June 21, 1966....	26.40
Oct. 21..........	30.06	Nov. 1..........	28.86	July 5..........	26.00
Nov. 11..........	29.16	Dec. 28..........	28.48	Aug. 15..........	25.55
Mar. 25, 1965....	29.02	Jan. 25, 1966....	27.84	Sept. 13..........	25.62
Apr. 26..........	29.05	Feb. 16..........	27.62	Oct. 11..........	25.17
May 17..........	29.18	Mar. 16..........	26.79	Nov. 18..........	25.53
June 23..........	30.00	Apr. 13..........	27.28	Dec. 19..........	24.69
July 19..........	30.28	May 25..........	26.64	Jan. 23, 1967....	25.00
Aug. 26..........	29.77				

149-72-3aaa2

Date	Water level	Date	Water level	Date	Water level
Aug. 15, 1966....	12.25	Dec. 19, 1966....	13.70	Apr. 19, 1967....	14.28
Sept. 13..........	12.92	Jan. 23, 1967....	14.03	May 25..........	13.29
Oct. 11..........	13.20	Feb. 16..........	14.22	June 21..........	12.72
Nov. 21..........	13.45	Mar. 15..........	14.50		

Depth to water in feet below land surface

149-72-20aaa

Date	Water level	Date	Water level	Date	Water level
Sept. 16, 1964	8.89	May 17, 1965	8.85	Dec. 28, 1965	Frozen
Oct. 21	8.75	June 23	8.36	Jan. 25, 1966	Frozen
Nov. 11	8.75	July 19	8.89	Feb. 16	Frozen
Jan. 20, 1965	9.68	Aug. 18	8.14	June 21	5.60
Feb. 18	9.66	26	8.29	July 5	5.80
Mar. 25	Frozen	Sept. 14	8.40	Aug. 15	7.06
Apr. 26	9.29	Nov. 1	8.04	Sept. 13	7.67
				Caved--well destroyed	

149-73-3daa

Date	Water level	Date	Water level	Date	Water level
Sept. 16, 1964	20.77	Aug. 26, 1965	20.63	Aug. 15, 1966	19.49
Oct. 21	20.68	Sept. 14	20.43	Sept. 13	19.44
Nov. 11	20.73	Nov. 1	20.47	Oct. 11	19.34
Jan. 20, 1965	20.69	Dec. 28	20.23	Nov. 21	19.25
Feb. 28	20.76	Jan. 25, 1966	19.99	Dec. 19	19.28
Mar. 25	20.89	Feb. 16	20.04	Jan. 23, 1967	19.36
Apr. 26	20.56	Mar. 16	19.51	Feb. 15	19.70
May 17	20.66	Apr. 13	19.87	Mar. 15	19.54
June 23	20.69	May 25	19.82	Apr. 19	19.50
July 19	20.60	June 21	19.73	May 24	19.39
Aug. 18	20.67	July 5	19.63	June 21	19.10

150-68-3daa

Date	Water level	Date	Water level	Date	Water level
Sept. 17, 1964	19.35	July 20, 1965	18.76	May 26, 1966	17.95
Oct. 21	19.32	Aug. 17	18.47	June 22	17.60
Nov. 12	19.12	26	18.34	July 6	17.70
Jan. 20, 1965	19.19	Sept. 15	18.34	Aug. 16	17.70
Feb. 18	19.45	Nov. 1	18.19	Sept. 13	17.89
Mar. 25	19.54	Dec. 29	17.97	Oct. 12	17.98
Apr. 26	19.41	Feb. 16, 1966	18.37	Nov. 21	17.99
May 17	19.01	Mar. 17	18.27	Dec. 20	18.28
June 23	18.99	Apr. 14	18.54	Jan. 24, 1967	18.58

150-68-14dcc

Date	Water level	Date	Water level	Date	Water level
Sept. 17, 1964	13.72	Aug. 26, 1965	12.13	Sept. 13, 1966	11.89
Oct. 21	13.80	Sept. 15	12.37	Oct. 12	12.10
Nov. 12	13.62	Nov. 1	12.64	Nov. 21	12.35
Jan. 20, 1965	13.20	Dec. 29	12.82	Dec. 20	12.54
Feb. 18	14.47	Feb. 16, 1966	13.30	Jan. 24, 1967	12.85
Mar. 25	14.60	Mar. 17	10.74	Feb. 16	13.03
Apr. 26	12.72	Apr. 14	12.66	Mar. 15	13.00
May 17	12.50	May 25	12.54	Apr. 20	12.25
June 23	12.44	June 22	12.04	May 25	11.29
July 20	12.32	July 6	11.96	June 21	10.92
Aug. 17	12.16	Aug. 16	11.74		

Depth to water in feet below land surface

150-69-14cdc

Date	Water level	Date	Water level	Date	Water level
Sept. 17, 1964....	13.65	Mar. 25, 1965....	14.20	Aug. 17, 1965....	12.30
Oct. 21..........	13.85	Apr. 26..........	13.50	26..........	12.47
Nov. 12..........	13.76	May 17..........	13.13	Sept. 15..........	12.80
Jan. 20, 1965....	13.74	June 23..........	13.10	Measurement discontinued	
Feb. 18..........	14.18	July 20..........	13.16		

150-70-19cdc

July 7, 1964....	8.11	July 20, 1965....	2.50	Apr. 13, 1966....	5.93
Oct. 21..........	9.21	Aug. 18..........	4.55	May 25..........	3.60
Nov. 12..........	9.53	26..........	4.85	June 21..........	4.85
Jan. 20, 1965....	11.31	Sept. 15..........	3.96	July 6..........	5.60
Feb. 18..........	11.92	Nov. 1..........	4.44	Aug. 16..........	6.97
Mar. 25..........	12.03	Dec. 28..........	Frozen	Sept. 13..........	7.75
Apr. 26..........	11.13	Jan. 25, 1966....	Frozen	Oct. 11..........	9.13
May 17..........	9.86	Feb. 16..........	Frozen	Plugged	
June 23..........	8.94	Mar. 16..........	5.83		

150-70-25ccb

Sept. 18, 1964....	6.22	Nov. 1, 1965....	3.92	Sept. 13, 1966....	5.60
Oct. 21..........	6.05	Dec. 29..........	Frozen	Oct. 11..........	5.69
Nov. 12..........	6.12	Jan. 25, 1966....	5.52	Nov. 21..........	5.78
Mar. 25, 1965....	Frozen	Feb. 16..........	5.35	Dec. 20..........	6.04
Apr. 26..........	5.10	Mar. 16..........	4.28	Jan. 23, 1967....	6.22
May 17..........	5.19	Apr. 13..........	4.24	Feb. 16..........	6.38
June 23..........	3.99	May 25..........	3.94	Mar. 15..........	6.19
July 20..........	2.28	June 21..........	4.50	Apr. 19..........	4.57
Aug. 17..........	3.98	July 6..........	4.19	May 25..........	4.29
26..........	4.45	Aug. 16..........	5.15	June 21..........	5.20
Sept. 15..........	4.13				

150-70-31cdd

Aug. 16, 1966....	82.53	Nov. 21, 1966....	82.40	Feb. 16, 1967....	82.18
Sept. 13..........	82.60	Dec. 20..........	82.36	Mar. 15..........	82.25
Oct. 11..........	82.50	Jan. 23, 1967....	82.29	Well destroyed	

Depth to water in feet below land surface

150-71-4ddd

Date	Water level	Date	Water level	Date	Water level
Nov. 10, 1965....	53.70	June 21, 1966...	53.55	Jan. 23, 1967....	53.33
Dec. 28..........	53.59	July 5.........	53.53	Feb. 16..........	53.25
Jan. 25, 1966....	53.60	Aug. 16.........	53.64	Mar. 15..........	53.30
Feb. 16..........	53.56	Sept. 13.........	53.70	Apr. 19..........	53.12
Mar. 16..........	53.36	Oct. 11.........	53.54	May 24..........	53.08
Apr. 13..........	53.56	Nov. 21.........	53.45	June 21..........	53.15
May 25..........	53.64	Dec. 19.........	53.45		

150-71-6aaa

Date	Water level	Date	Water level	Date	Water level
Sept. 16, 1964....	7.88	July 19, 1965....	6.23	May 25, 1966....	2.99
Oct. 21..........	7.67	Aug. 18..........	4.22	June 21..........	3.89
Nov. 12..........	7.84	26..........	4.57	July 5..........	3.80
Jan. 20, 1965....	8.34	Sept. 14..........	4.45	Aug. 16..........	5.96
Feb. 18..........	8.73	Nov. 1..........	4.58	Sept. 13..........	6.50
Mar. 25..........	Frozen	Dec. 28..........	5.79	Oct. 11..........	7.16
Apr. 26..........	9.22	Jan. 25, 1966....	Frozen	Nov. 21..........	7.40
May 17..........	5.55	Feb. 16..........	Frozen	Dec. 19..........	7.75
June 23..........	6.55	Apr. 13..........	Frozen	Jan. 23, 1967....	Frozen

150-71-26abb

Date	Water level	Date	Water level	Date	Water level
Oct. 29, 1965....	63.40	May 25, 1966....	63.15	Dec. 20, 1966....	63.05
Nov. 1..........	63.32	June 21..........	63.17	Jan. 23, 1967....	62.92
Dec. 28..........	63.19	July 6..........	63.19	Feb. 16..........	62.75
Jan. 25, 1966....	63.15	Aug. 16..........	63.22	Mar. 15..........	62.86
Feb. 16..........	63.05	Sept. 13..........	63.22	Apr. 19..........	62.67
Mar. 16..........	62.82	Oct. 11..........	63.15	May 25..........	62.70
Apr. 13..........	63.04	Nov. 21..........	62.98	June 21..........	62.80

150-71-29aab

Date	Water level	Date	Water level	Date	Water level
Aug. 16, 1966....	7.35	Dec. 19, 1966....	7.35	Apr. 19, 1967....	7.60
Sept. 13..........	7.37	Jan. 23, 1967....	7.35	May 24..........	7.65
Oct. 11..........	7.30	Mar. 15..........	7.59	June 21..........	7.55
Nov. 21..........	7.27				

Depth to water in feet below land surface

150-72-21cdc

Date	Water level	Date	Water level	Date	Water level
Jan. 20, 1965	11.94	Feb. 10, 1966	11.40	Oct. 30, 1966	11.03
25	12.20	16	11.71	Nov. 7	11.12
30	12.50	20	11.87	10	11.04
Feb. 1	12.50	25	12.25	15	11.22
5	12.53	Mar. 1	12.50	21	11.13
10	13.05	5	12.14	25	10.95
15	12.96	10	12.08	30	11.23
20	13.24	15	9.70	Dec. 1	11.10
25	13.42	20	6.66	5	11.12
Mar. 1	13.54	26	7.50	10	11.35
5	13.68	30	7.64	15	11.43
10	13.37	Apr. 1	7.96	20	11.50
15	13.15	5	8.20	24	11.63
20	13.07	15	8.57	26	11.67
25	12.90	20	8.60	30	11.56
30	13.06	25	8.80	Jan. 2, 1967	11.58
Apr. 1	13.12	30	8.85	5	11.63
5	13.04	May 1	8.60	10	11.73
10	12.66	5	8.75	15	11.55
15	11.45	10	8.91	20	11.74
20	10.93	15	8.85	25	11.98
25	10.62	20	9.04	27	12.01
30	10.68	26	9.25	30	11.98
May 1	10.69	30	9.55	Feb. 1	12.14
5	10.53	June 1	9.65	5	11.95
10	10.58	5	9.46	10	12.06
15	10.60	10	9.35	15	12.35
20	10.62	15	9.34	20	12.54
25	10.73	20	9.50	25	12.85
30	10.40	25	10.02	28	13.01
June 1	10.45	30	9.86	Mar. 1	12.97
5	10.51	July 11	9.55	6	12.92
10	10.64	15	9.80	10	12.72
15	10.93	20	10.25	15	12.63
18	11.05	25	10.45	20	12.00
23	11.18	30	10.50	25	11.55
25	11.20	Aug. 1	10.55	30	10.50
30	11.26	5	10.84	Apr. 1	10.50
July 1	11.21	10	10.30	5	10.39
5	11.08	15	10.33	10	10.72
10	10.54	20	10.60	15	10.76
15	10.05	25	10.34	20	9.94
20	10.08	30	10.68	25	9.82
25	9.78	Sept. 1	10.67	29	9.71
30	9.80	5	10.60	May 1	9.77
Aug. 1	9.60	10	10.80	5	9.66
Nov. 30	9.20	16	11.01	10	9.01
Dec. 30	9.35	20	11.01	15	8.90
Jan. 1, 1966	9.56	25	10.95	20	9.18
5	9.75	30	10.96	25	9.13
10	9.90	Oct. 1	10.85	30	9.48
15	10.06	5	10.94	June 1	9.70
20	10.00	10	11.00	5	10.02
25	10.24	15	11.11	10	9.78
30	10.61	20	10.93	15	9.89
Feb. 1	10.91	25	11.07	20	9.66
5	11.22				

Depth to water in feet below land surface

150-73-13bbc

Date	Water level	Date	Water level	Date	Water level
Sept. 15, 1964....	16.71	Aug. 26, 1965....	14.40	Sept. 13, 1966....	13.36
Oct. 21..........	15.73	Sept. 14..........	14.37	Oct. 11..........	13.65
Nov. 11..........	15.10	Nov. 1..........	13.99	Nov. 21..........	13.68
Jan. 20, 1965....	16.25	Dec. 28..........	13.88	Dec. 19..........	13.92
Feb. 18..........	15.44	Jan. 25, 1966....	Frozen	Jan. 23, 1967....	13.99
Mar. 25..........	15.57	Feb. 16..........	Frozen	Feb. 15..........	Frozen
Apr. 26..........	15.07	Apr. 13..........	14.37	Mar. 15..........	14.52
May 17..........	14.86	May 25..........	13.37	Apr. 19..........	13.95
June 23..........	14.51	June 21..........	12.67	May 24..........	12.33
July 19..........	14.43	July 5..........	12.20	June 21..........	12.20
Aug. 18..........	14.42	Aug. 15..........	12.89		

150-73-22cdd

Date	Water level	Date	Water level	Date	Water level
Sept. 15, 1964....	15.31	Aug. 18, 1965....	13.89	May 25, 1966....	12.64
Oct. 21..........	15.45	26..........	13.75	June 21..........	11.73
Nov. 11..........	15.32	Sept. 14..........	13.69	July 5..........	11.30
Feb. 18, 1965....	16.14	Nov. 1..........	12.72	Aug. 15..........	12.13
Mar. 25..........	16.43	Dec. 28..........	12.84	Sept. 13..........	12.70
Apr. 26..........	16.08	Jan. 25, 1966....	13.44	Oct. 11..........	12.89
May 17..........	15.87	Feb. 16..........	14.01	Nov. 21..........	13.20
June 23..........	15.17	Mar. 16..........	14.30	Dec. 19..........	13.66
July 19..........	14.69	Apr. 13..........	13.97	Jan. 23, 1967....	14.35

TABLE 4.--Logs of test holes and wells

145-68-10bcc
Test hole 2452

Altitude: 1,630 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, sandy loam, black	1	1
	Gravel, fine and medium, sandy, brown, moderately well-sorted, subangular to subrounded	9	10
	Sand, medium to very coarse, gravelly	20	30
Pierre Formation:			
	Shale, silty, olive-gray to olive-black, noncalcareous	23	53

145-68-12add
Test hole 2453

Altitude: 1,590 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, sandy loam	1	1
	Sand, medium to very coarse, gravelly, brown to gray, moderately well-sorted, subangular to subrounded	31	32
Pierre Formation:			
	Shale, olive-gray to olive-black	10	42

145-68-16ccc
Test hole 2451

Altitude: 1,668 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Sand and gravel, very coarse sand to medium gravel, clayey, moderate-yellow-brown	5	5
	Sand and gravel, yellow-brown, very clean	5	10
	Till, sandy, olive-gray	21	31
Pierre Formation:			
	Shale, olive-gray, noncalcareous	22	53

145-68-26dcc
Test hole 1891

Altitude 2,100 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Gravel, fine to medium, sandy, oxidized. Interbedded with layers of silty yellowish-brown oxidized clay	11	11
	Gravel, fine to medium, sandy to clayey	30	41
	Till, silty, olive-gray; numerous shale grains	80	121
	Clay, silty, greenish-gray, very thin laminae of lignite and organic material, weakly calcareous	58	179
Pierre Formation:			
	Shale, dark-greenish-gray	31	210

145-69-2bdb
C. E. Kutz
(Log by A. B. Kamoni)

Altitude: 1,670 feet

Formation	Material	Thickness (feet)	Depth (feet)
	Topsoil, black	3	3
	Clay, yellow	3	6
	Clay and rocks	3	9
	Gravel, coarse, sandy	5	14
	Clay, blue	1	15

145-69-2ccc
Test hole 2576

Altitude: 1,740 feet

Glacial drift:			
	Till, silty, dusky-yellow, oxidized	21	21
	Till, silty, dusky-yellow, contains sand lenses	8	29
	Sand, medium to coarse, gravelly	6	35
	Till, silty, olive-gray	4	39
	Sand, medium to coarse, gravelly	3	42
	Till, silty to sandy, olive-gray, rocky	52	94
	Sand, medium to coarse, subangular to subrounded	8	102
	Till, silty to gravelly, olive-gray	4	106
	Sand, medium to coarse	4	110
	Till, gravelly, olive-gray, drills moderately rough	192	302
	Sand, medium to coarse	2	304
	Till, silty, olive-gray	50	354
	Till, silty to sandy, olive-gray	12	366
	Till, silty, olive-gray	4	370
	Silt, sandy, olive-gray, drills tight	43	413
	Sand, medium to coarse, gravelly, drills rough	8	421
	Till, silty, olive-gray	7	428
Pierre Formation:			
	Shale, silty, olive-black, noncalcareous	13	441

145-69-8aaa
Test hole 2448

Altitude: 1,790 feet

Glacial drift:			
	Sand, fine, clayey, dark-brown to yellowish-gray	6	6
	Till, sandy, dusky-yellow to moderate-olive-brown, oxidized	16	22
	Gravel, fine to medium, sandy, reddish-brown, moderately sorted	8	30
	Till, sandy, olive-gray	27	57
	Sand, fine to coarse, gray	7	64
	Till, silty and sandy	9	73
	Sand, fine to coarse, gravelly, gray, poorly sorted, clay and till lenses present, interbedded	40	113
	Gravel, fine and medium, sandy, clayey	53	166
	Till, silty and sandy, olive-gray	46	212
	Till, silty, medium-olive-gray	29	241
Pierre Formation:			
	Shale, olive-gray to olive-black, noncalcareous	21	262

145-69-19aaa
Test hole 2641

Altitude: 1,860 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Till, very silty, dusky-yellow to yellowish-gray, oxidized	23	23
	Till, silty, olive-gray, drills tight	65	88
	Sand, medium to coarse	2	90
	Till, silty, olive-gray, very cohesive, drills moderately tight	206	296
Pierre Formation:			
	Silt, clayey, olive-gray, noncalcareous	27	323
	Shale, silty, dark-olive-gray to olive-black, noncalcareous, drills very tight	13	336

145-69-26bbb
Test hole 2449

Altitude: 1,811 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty loam, black	1	1
	Gravel, fine to medium, oxidized	2	3
	Sand, very clayey, yellowish-gray	2	5
	Till, silty and sandy, moderate-olive-brown, oxidized	9	14
	Till, olive-gray, cohesive, moderately hard	199	213
	Gravel, fine to coarse, sandy, clayey, gray, did not take water	33	246
	Sand, very fine to fine, silty, olive-gray, calcareous	7	253
	Gravel, clayey, sandy, did not take water	16	269
	Till, silty, olive-gray	32	301
Fox Hills Formation:			
	Sandstone, very fine grained, olive-gray to dark-greenish-gray, calcareous	20	321
	Shale, silty, light-olive-gray, calcareous	6	327
	Sandstone, dark-greenish-gray, calcareous	9	336

145-69-36ddd
Test hole 2450

Altitude: 1,811 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty loam, black	1	1
	Till, yellowish-gray	4	5
	Till, sandy, dusky-yellow to light-olive-brown	15	20
	Gravel, fine to medium, sandy	3	23
	Till, yellowish-brown	8	31
	Till, light-olive-gray	37	68
	Till, silty, olive-gray	42	110
	Till, silty to moderately sandy, olive-gray	58	168
	Till, very sandy, olive-gray	8	176
	Till, silty, olive-gray, drills very smooth, little or no change in lithology	120	296
	Till, silty to moderately sandy, olive-gray	80	376
Fox Hills Formation:			
	Sandstone, dark-greenish-gray, calcareous	2	378

145-70-9dcc
Test hole 2577

Altitude: 1,855 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, black	2	2
	Till, silty to slightly sandy, dusky-yellow, oxidized	9	11
	Till, silty, olive-gray	95	106
	Clay, silty, olive-gray, drills tight	7	113
	Till, silty, olive-gray	89	202
	Sand, subangular to subrounded, poorly sorted	5	207
	Till, silty to slightly sandy, olive-gray, good coherence and plasticity, shale and lignite present	199	406
Pierre Formation:			
	Shale, silty, olive-black, noncalcareous	35	441

145-70-21dab
Adam Stroh
(Log by A. B. Kamoni)

Topsoil, black	2	2
Clay, yellow	2	4
Gravel, yellow	5	9
Clay, yellow	5	14
Gravel, clayey, yellow	4	18
Gravel, gray	7	25
Clay, gravelly, gray	2	27

145-71-2abd
Chancy Gillham
(Log by Norm Stai)

Altitude: 1,905 feet

Topsoil	1	1
Clay, sandy, yellow	20	21
Clay, gray, (till)	42	63
Sand, fine, blue, contains lignite	7	70
Sand, fine to medium, with lignite	35	105
Clay, sandy	13	118
Clay, gray	2	120

145-71-25ddd
Test hole 2445

Altitude: 1,866 feet

Glacial drift:			
	Sand, clayey, dark-brown (road fill?)	7	7
	Clay, sandy, dusky-yellow	11	18
	Clay, olive-brown	3	21
	Till, sandy, olive-brown	12	33
	Till, sandy, olive-gray, lenses of fine to medium gray sand	15	48
	Till, sandy, olive-gray	66	114
	Gravel, fine and medium, with medium to very coarse sand, subangular to subrounded	12	126
	Till, silty to sandy, gravelly to rocky, olive-gray	46	172
	Clay, silty, light-olive-gray to olive-gray, very cohesive, drills easy	40	212

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift--Continued:			
	Till, sandy, olive-gray, some gravel lenses present throughout	127	339
Fox Hills Formation:			
	Shale, sandy, light-olive-gray, calcareous	14	353
	Shale, extremely silty, calcareous	8	361
	Sand, fine, greenish-gray to dark-greenish-gray, highly calcareous	17	378
	Shale, silty and sandy, dark-greenish-gray, calcareous	10	388

145-71-28ddc
Clifford Hoff
(Log by A. B. Kamoni)

Topsoil, black	2	2
Clay, sandy, yellow	12	14
Gravel, yellow	7	21
Clay, blue-gray	9	30

145-72-10aaa
Test hole 2482

Altitude: 1,844 feet

Glacial drift:			
	Topsoil, sandy loam, black	2	2
	Till, very sandy, dusky-yellow	9	11
	Till, silty, pebbly, moderate-olive-brown	13	24
	Till, silty, olive-gray	7	31
	Sand, fine to coarse, light-tannish-gray, moderately well-sorted, did not take much water	6	37
	Till, silty, olive-gray	13	50
	Till, silty and very sandy, olive-gray, some sand lenses, rocks, and zones of gypsum--cemented gravel	90	140
	Gravel, fine to coarse, sandy, poorly sorted	18	158
	Till, very silty and sandy, olive-gray, rocks and occasionally sand lenses present	147	305
	Gravel, fine to coarse, sandy, moderately well-sorted, subangular and subrounded, takes water	20	325
	Till, silty and sandy, olive-gray	3	328
	Gravel, fine to coarse, cobbles present, rough drilling	13	341
	Till, silty and sandy, very rocky, olive-gray	20	361
Fox Hills Formation:			
	Shale, very sandy, light-olive-gray to greenish-gray	28	389

145-72-23cba
R. R. Rodacker
(Log by A. B. Kamoni)

Topsoil	2	2
Clay, yellow	10	12
Gravel, coarse	4	16
Clay, gray, soft	50	66
Sand, dry	4	70
Clay, gray, soft	29	99
Sand, fine, layered with clay	7	106

145-73-24ddc
Test hole 2508

Altitude: 2,064 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, black	1	1
	Till, silty to slightly sandy, dark-yellowish-brown, oxidized	31	32
	Till, olive-gray	39	71
	Clay, very silty, dark-greenish-gray	25	96
	Till, olive-gray	26	122
	Clay, dark-greenish-gray	8	130
	Till, olive-gray	11	141
	Clay, very silty, dark-greenish-gray	46	187
	Till, silty, olive-gray, few rocks present	86	273
Hell Creek Formation:			
	Shale, very silty, greenish-black to dusky-blue-green, blocky fracture, very hard and brittle, noncalcareous	42	315

146-68-4bcb
Test hole 2455

Altitude: 1,590 feet

Glacial drift:			
	Topsoil, silty clay, black	3	3
	Till, sandy, dusky-yellow, oxidized	3	6
Pierre Formation:			
	Shale, light-olive-gray	5	11
	Shale, dark-olive-gray	10	21

146-68-15dcc
Clinton Kutz
(Log by A. B. Kamoni)

Altitude: 1,600 feet

Topsoil, black	2	2
Clay, yellow	4	6
Sand, clayey, yellow	4	10
Clay, sandy, gray	8	18
Shale, dry	18	36
Shale, gray, water-bearing	17	53

146-68-29daa
Test hole 2454

Altitude: 1,645 feet

Glacial drift:			
	Topsoil, silty loam, black	1	1
	Till, sandy, dusky-yellow, oxidized	9	10
	Till, sandy, olive-gray	11	21
Pierre Formation:			
	Shale, dark-greenish-gray, very hard, noncalcareous	21	42

146-69-4ddd
Test hole 2652

Altitude: 1,632 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, black	1	1
	Till, silty, moderate-yellowish-brown	14	15
	Till, very silty to sandy, moderate-brown	10	25
	Till, silty, olive-gray	95	120
	Till, silty, olive-gray, rocky	10	130
	Till, silty, olive-gray	96	226
	Gravel, medium to coarse, subangular	3	229
	Till, silty, olive-gray	12	241
	Silt, clayey, brown tint (samples poor)	11	252
	Till, silty, olive-gray	34	286
Pierre Formation:			
	Shale, olive-black, noncalcareous	34	320

146-69-21bdd
Leander Richter
(Log by A. B. Kamoni)

Altitude: 1,677 feet

	Topsoil, black	2	2
	Sand, clayey, yellow	2	4
	Sand, yellow	13	17
	Sand, gray	7	24

146-69-24bba
Test hole 2507

Altitude: 1,707 feet

Glacial drift:			
	Topsoil, silty, black	1	1
	Till, silty to sandy, dusky-yellow to moderate-yellowish-brown, oxidized	21	22
	Till, silty, olive-gray, moderately hard	49	71
	Rocks and gravel, cemented, rough drilling	1	72
Pierre Formation:			
	Shale, olive-black	12	84

146-69-27aaa
Test hole 2575

Altitude: 1,655 feet

Glacial drift:			
	Silt, dusky-yellowish-brown	6	6
	Sand, medium to coarse, gravelly, oxidized	4	10
	Till, very silty to sandy, dusky-yellow to moderate-olive-brown, oxidized	4	14
	Till, silty, olive-gray, lignite and shale fragments present	261	275
Pierre Formation:			
	Shale, olive-black, brittle	19	294

146-69-36bac
Richard Neumiller
(Log by A. B. Kamoni)

Altitude: 1,643 feet

Formation	Material	Thickness (feet)	Depth (feet)
	Topsoil, sandy, black	2	2
	Sand, fine	15	17
	Gravel, coarse, sandy	2	19
	Rocks	1	20
	Clay, blue	2	22
	Gravel	4	26
	Sand, fine, gray	3	29

146-70-3cdc1
Nick Wentz
(Log by A. B. Kamoni)

	Topsoil, black	2	2
	Sand, yellow	7	9
	Quicksand, yellow	5	14
	Quicksand, gray	3	17
	Soapstone, gray	3	20

146-70-9ddd
Arthur Erfle
(Log by A. B. Kamoni)

Altitude: 1,720 feet

	Topsoil, black	2	2
	Clay, sandy	12	14
	Rocks	2	16
	Sandstone and gravel	4	20
	Sand (dry)	4	24
	Sand, gray (water)	1	25

146-70-11bcb
Test hole 2446

Altitude: 1,695 feet

Pierre Formation:			
	Clay, white and gray, "blocky" (weathered shale)	8	8
	Shale, yellowish and reddish-brown, oxidized	7	15
	Shale, olive-black, noncalcareous	17	32

146-70-13ccc1
Test hole 2578

Altitude: 1,690 feet

Glacial drift:			
	Topsoil, sandy, black	1	1
	Sand, medium to coarse, dusky-yellow, oxidized	1	2
	Sand, medium to coarse, gravelly	29	31
	Gravel, medium to very coarse	3	34

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift--Continued:			
	Clay, very silty, olive-gray	3	37
	Sand, fine to coarse	1	38
	Clay, very silty, olive-gray	2	40
	Sand, fine to coarse	3	43
	Clay, silty, olive-gray, contains small sand lenses	11	54
	Clay, silty, olive-gray, drills tight	5	59
	Till, silty to slightly sandy, olive-gray	19	78
Pierre Formation:			
	Silt, olive-gray, brittle, noncalcareous	27	105

146-70-13ccc2
Test hole 2578A

Altitude: 1,692 feet

Glacial drift:			
	Topsoil, silty, black	1	1
	Sand, fine to medium, gravelly	30	31
	Gravel, medium to coarse	4	35
	Clay, silty, olive-gray	7	42

146-70-23ada
Lloyd Miller
(Log by Norm Stai)

Altitude: 1,712 feet

Topsoil	1	1
Clay, yellow	5	6
Clay, brown	2	8
Clay, yellow	14	22
Clay, sandy, brown	3	25
Sand, fine, brown	4	29
Clay, gray	4	33
Silt, fine, gray	9	42
Clay, gray	3	45
Silt, gray, fine	4	49
Clay, sandy, gray	17	66
Clay, sticky, gray	80	146
Clay, sandy	20	166
Clay	29	195
Sandstone	5	200
Clay	15	215

146-70-35aaa
Test hole 2447

Altitude: 1,775 feet

Glacial drift:			
	Topsoil, silty, black	1	1
	Sand, clayey, yellowish-gray	4	5
	Till, sandy, dusky-yellow, oxidized	6	11
	Till, silty, olive-brown, oxidized	30	41
	Till, silty to sandy, olive-gray	31	72
	Sand, fine to medium, silty	4	76
	Till, silty and sandy, olive-gray	86	162
	Till, silty to very sandy, small sand lenses throughout	19	181

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift--Continued:			
	Till(?), drills tight but not as tight as bedrock below, possibly a weathered zone	10	191
Fox Hills Formation:			
	Sand, very fine, clayey, olive-gray to dark-greenish-gray, calcareous	19	210

146-71-4aaa
Test hole 2476

Altitude: 1,700 feet

Glacial drift:			
	Topsoil	1	1
	Sand, medium to coarse, dusky-yellow, well-sorted, subangular to subrounded	9	10
	Sand, medium to very coarse, olive-gray, subangular to subrounded, fairly well-sorted	29	39
	Gravel, fine, sandy, moderately well-sorted	13	52
Fox Hills Formation:			
	Clay, sandy, light-gray	6	58

146-71-13ddd
Test hole 2480

Altitude: 1,795 feet

Glacial drift:			
	Topsoil, sandy loam, black	1	1
	Till, very sandy, reddish-yellow, oxidized	10	11
	Till, sandy, moderate-olive-brown, oxidized	7	18
	Till, very sandy, olive-gray, unoxidized	17	35
	Till, very sandy, olive-gray, coarse sand and fine gravel lenses throughout	14	49
	Till, very sandy, olive-gray	9	58
	Till, fairly sandy, olive-gray to dark-greenish-gray	21	79
	Till, sandy, olive-gray, some sand lenses, rocky in spots	76	155
	Till, olive-gray, tightly compacted	19	174
Fox Hills Formation:			
	Sandstone, very fine to fine grained, slightly clayey, light-olive-gray with tints of green and brown	12	186
Pierre Formation:			
	Shale, silty and sandy, light-olive-gray, drills very tight	14	200

146-71-15bac
(Village of Bowden)

Altitude: 1,810 feet)

Surface soil	3	3
Clay, yellow	46	49
Sand and gravel	8	57
Clay, gray	151	208
Clay, sandy	16	224
Sand and gravel	5	229
Clay, gray	43	272
Sand and gravel	2	274
Clay, gray	9	283
Sand, fine	2	285
Sand, coarse	2	287
Clay, dark	38	325

146-71-17ccc1
Test hole 2481

Altitude: 1,808 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty loam, black	1	1
	Till, sandy and gravelly, yellowish-gray	4	5
	Till, silty and sandy, moderate-olive-brown	23	28
	Till, silty and sandy, olive-gray	10	38
	Till, silty and sandy, olive-gray, large amount of shale particles	37	75
	Sand, fine to coarse, slightly clayey in spots, gray, shale and coal present, takes water	35	110
	Sand, same as above but with more clay	10	120
	Till, sandy, olive-gray	7	127
	Sand, fine to medium, gray, moderately well-sorted, very shaly	9	136
	Till, silty and sandy, olive-gray	53	189
	Till, very sandy, olive-gray	8	197
	Till, silty to sandy, olive-gray, drills tight	59	256
	Sand, medium and coarse, gravelly, large amount of shale	9	265
	Till, silty and sandy, olive-gray, tightly compacted	73	338
Fox Hills Formation:			
	Shale, sandy to silty, yellowish-gray to light-olive-gray	12	350
	Sand, very fine to fine, dark-greenish-gray	7	357
	Clay, sandy, light-olive-gray to greenish-gray	11	368

146-71-17ccc2
Test hole 2481A

Altitude: 1,808 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty loam, black	1	1
	Till, sandy, moderate-olive-brown, oxidized	28	29
	Till, silty and sandy, some very small sand lenses	87	116

146-71-18ccd2
Ben Hagelie
(Log by A. B. Kamoni)

Material	Thickness (feet)	Depth (feet)
Cobblestones	3	3
Sand, yellow	9	12
Sea mud,1/ yellow	1	13
Sand, yellow	4	17
Sea mud, gray	5	22
Sea mud, green	3	25
Sand, fine to coarse	8	33
Clay, sandy, gray	2	35

1/ Author's interpretation of sea mud is lake clay.

146-71-32ada
Albert Fuhrman
(Log by A. B. Kamoni)

Material	Thickness (feet)	Depth (feet)
Topsoil, black	8	8
Sand, yellow	6	14
Clay, yellow	2	16
Sand, yellow	8	24
Sand	10	34
Clay, blue	3	37

146-71-32bbb
Test hole 2543

Altitude: 1,855 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, black	1	1
	Till, very silty, moderate-yellowish-brown, highly oxidized	23	24
	Till, silty, olive-gray, moderately hard, low pebble density	80	104
	Till, silty, olive-gray, large amount of lignite present	8	112
	Till, silty, olive-gray	33	145
	Gravel, medium to coarse grained, poorly sorted, angular to subangular	5	150
	Till, silty, olive-gray, moderately hard	173	323
	Gravel, fine to medium, angular to subangular	5	328
	Clay, very silty to sandy, olive-gray	17	345
	Till, olive-gray	50	395
	Gravel, fine to medium, angular to subangular	2	397
	Till, silty, olive-gray	44	441
	Rock, granite	2	443
Pierre Formation:			
	Shale, olive-gray	9	452

146-72-14bbb
Test hole 2542

Altitude: 1,832 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, black	1	1
	Till, very silty, moderate-yellowish-brown to dusky-yellow, highly oxidized	22	23
	Till, moderately silty, olive-gray	48	71
	Sand, very coarse to fine gravel, angular to subangular, "heaved"	10	81
	Till, olive-gray, moderately hard (samples very poor)	221	302
	Gravel, fine to medium grained, very angular, drills rough, possibly cemented	15	317
	Clay, very silty to sandy, olive-gray	22	339
	Till, silty, olive-gray	10	349
Fox Hills Formation:			
	Clay, very sandy, dark-greenish-gray, slightly indurated	19	368

146-73-3ccc
Test hole 2510

Altitude: 1,874 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, black	1	1
	Till, dark-yellowish-brown, extremely hard	24	25
	Till, olive-gray, very hard, fairly smooth, large amount of igneous material	139	164
	Till, with gravel layers	22	186
	Till, silty, olive-gray	42	228
	Gravel, clayey	11	239
	Till, silty, olive-gray	11	250
	Gravel, clayey	10	260
	Clay, very silty to sandy, fairly hard	40	300
	Till, moderate olive-brown, very hard	48	348
Fox Hills Formation:			
	Siltstone, silty to sandy, brown	16	364

146-73-26ddd
Test hole 2509

Altitude: 1,820 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, black	1	1
	Till, silty, dusky-yellow, oxidized	4	5
	Till, silty, dark-yellowish-brown	14	19
	Till, olive-gray, large amount of coal fragments	4	23
	Gravel, medium to coarse, sandy, angular	2	25
	Till, silty, olive-gray, moderately hard	85	110
	Sand, medium to coarse, gravelly, angular limestone	2	112
	Till, olive-gray, moderately hard	44	156
	Gravel, medium to coarse, angular limestone	5	161
	Till, olive-gray	11	172
	Gravel, medium to coarse	2	174
	Till, gravelly	3	177
	Gravel, very coarse, angular, poorly sorted, mostly limestone	7	184
	Till, rocky, olive-gray	3	187
	Gravel, fine to coarse, clayey, poorly sorted	17	204
	Till, rocky, gravel layers	25	229
	Gravel, medium to coarse, angular limestone	21	250
	Till, gravelly, olive-gray	33	283
	Till, extremely hard, olive-gray	95	378
	Clay, silty to slightly sandy, very calcareous, dark-greenish-gray, some small pebbles present	21	399
Fox Hills Formation:			
	Clay, very silty to moderately sandy, bluish-green to brown	10	409
	Siltstone, hard and brittle, olive-gray	11	420

147-68-1bbb
Test hole 2625

Altitude: 1,566 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Till, silty to sandy, dusky-yellow, oxidized	13	13
	Till, silty, olive-gray	35	48
	Sand, medium to coarse grained, subangular to subrounded, some lignite present	17	65
	Sand, medium to coarse, gravelly, subangular to subrounded, drills rough	3	68
Pierre Formation:			
	Shale, olive-gray to olive-black, brittle, noncalcareous	37	105

147-68-4bbb
Test hole 2569

Altitude: 1,585 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, dusky-brown	1	1
	Till, silty, dusky-yellow, oxidized	14	15
	Till, sandy, moderate-olive-brown to olive-gray	6	21
	Sand, fine to medium, oxidized	7	28
	Till, silty to slightly sandy, dusky-yellow, oxidized	2	30
	Sand, fine to medium, oxidized	4	34
	Till, silty, olive-gray	58	92
	Gravel, sandy, poorly sorted	4	96
	Till, silty to gravelly	44	140
	Rock, abandoned hole		

147-68-9ccc
Test hole 2571

Altitude: 1,587 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, dusky-brown	1	1
	Till, silty to sandy, dusky-yellow, oxidized	22	23
	Till, silty, olive-gray	24	47
	Silt, olive-gray	10	57
	Till, silty, olive-gray	8	65
	Sand, poorly sorted	5	70
	Till, slightly gravelly, olive-gray	5	75
	Gravel, sandy, drills rough	3	78
	Till, gravelly, olive-gray, drills smooth	60	138
Pierre Formation:			
	Shale, olive-black	10	148

147-68-10add
Test hole 2457

Altitude: 1,555 feet

Glacial drift:			
	Topsoil, silty loam, black	1	1
	Till, sandy, yellowish-brown	9	10
	Till, light-olive-gray	24	34
	Sand, coarse to very coarse, large amount of shale and coal present, takes water	38	72
	Gravel, coarse to very coarse, large amount of lignite, well-sorted	8	80
Pierre Formation:			
	Shale, dark-greenish-gray	15	95

147-68-20add
Test hole 2456

Altitude: 1,580 feet

Glacial drift:			
	Topsoil, black	2	2
	Till, very sandy, dusky-yellow	18	20
	Till, very sandy, olive-gray	1	21
	Sand	1	22
	Till, very sandy, grayish-olive-green, highly cohesive, moderately rocky	174	196
Pierre Formation:			
	Shale, silty, olive-green, highly fissile	24	220

147-68-22aaa2
Test hole 2570

Altitude: 1,580 feet

Glacial drift:			
	Topsoil, silty, black	1	1
	Till, silty, dusky-yellow, oxidized	9	10
	Till, silty with sand layers, dusky-yellow, oxidized	11	21
	Gravel, sandy, angular, drills rough	7	28
	Till, silty to slightly gravelly	61	89
	Gravel, sandy, poorly sorted, drills rough	2	91
	Till, silty, olive-gray	18	109
	Sand, medium to very coarse, gravelly, subangular to subrounded, large amount of lignite present	48	157

Formation	Material	Thickness (feet)	Depth (feet)
Pierre Formation:			
	Shale, silty, olive-black, drills tight	22	179

147-68-25ddd1
Test hole 1468

Altitude: 1,590 feet

Glacial drift:			
	Topsoil, black	1	1
	Till, buff to yellow	14	15
	Sand, very fine to coarse, moderately silty to clean, large amount of shale and lignite	6	21
	Till, gravelly, gray	149	170
Pierre Formation:			
	Shale, blue-gray, soft to brittle, noncalcareous	8	178

147-68-30ddd
Test hole 2572

Altitude: 1,597 feet

Glacial drift:			
	Topsoil, silty, dusky-brown	1	1
	Clay, silty, yellowish-gray	3	4
	Sand, medium to coarse, gravelly	8	12
Pierre Formation:			
	Shale, olive-black, drills tight	9	21

147-68-34aaa
Test hole 2626

Altitude: 1,691 feet

Glacial drift:			
	Topsoil, silty, black	1	1
	Till, silty, dusky-yellow, drills rough	5	6
	Till, silty to sandy, dusky-yellow	14	20
	Till, silty, olive-gray, drills rough	5	25
	Till, silty, olive-gray	61	86
	Till, silty, dark-olive-gray, drills smooth	24	110
Pierre Formation:			
	Shale, olive-black, brittle, noncalcareous	37	147

147-69-5bbb
Test hole 2479

Altitude: 1,595 feet

Glacial drift:			
	Topsoil, silty loam, black	1	1
	Till, sandy, dusky-yellow, oxidized	5	6
	Till, very shaly, moderate-olive-brown to light-olive-gray, partially oxidized	13	19
	Till, very shaly, olive-gray, unoxidized	22	41
Pierre Formation:			
	Shale, silty, olive-black, noncalcareous, contains some bluish-white bentonite lenses	22	63

147-69-13bbd1
Test hole 2574

Altitude: 1,580 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, black	1	1
	Till, silty, dusky-yellow, oxidized	22	23
	Till, silty, olive-gray	17	40
	Sand, medium to coarse, clayey, consists of shale particles	11	51
	Silt, sandy, olive-gray, drills tight	27	78
	Clay, olive-gray, very compact, drills tight	8	86
	Till, silty, olive-gray	37	123
	Sand, coarse, gravelly	2	125
	Till, silty to gravelly, olive-gray	8	133
Pierre Formation:			
	Shale, olive-black	25	158

147-69-20cdd
Orval Heiden
(Log furnished by Schnell Inc.)

Altitude: 1,637 feet

	Topsoil	2	2
	Sand, yellow	15	17
	Clay, gray, boulders	4	21
	Sand, very fine, dry	11	32
	Clay, sand, gravel	51	83
	Sand	4	87
	Clay	21	108

147-69-30bbb
Test hole 2651

Altitude: 1,633 feet

Glacial drift:			
	Topsoil, black	1	1
	Till, very silty, moderate-yellowish-brown, oxidized	3	4
	Gravel, sandy, angular, oxidized	2	6
	Till, rocky, moderate-yellow-brown, oxidized	5	11
	Till, silty, olive-gray, extremely rocky	29	40
	Silt, clayey to sandy, very dusky-red (10 R 2/2), soft	4	44
	Till, silty, olive-gray, hard	96	140
Fox Hills Formation:			
	Clay, very silty to sandy, contains sandstone layers, noncalcareous, dusky-blue-green and mottled with brown tints	10	150
Pierre Formation:			
	Shale, olive-black, highly fissile, noncalcareous	30	180

147-69-34bbb
Test hole 2573

Altitude: 1,620 feet

Glacial drift:			
	Topsoil, silty, black	1	1
	Till, silty, dusky-yellow, oxidized	4	5
	Sand, medium to coarse, gravelly, oxidized	7	12
	Till, silty, dusky-yellow	6	18
	Till, silty, olive-gray, drills fast and smooth	148	166

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift--Continued:			
	Till, olive-gray, with sand and gravel layers	14	180
	Till, silty, olive-gray	45	225
	Sand, coarse to very coarse, clayey	9	234
	Till, silty, olive-gray	7	241
	Till, sandy to gravelly, olive-gray	10	251
	Till, silty, olive-gray	8	259
	Till, gravelly, olive-gray, drills very rough	10	269
	Silt, olive-gray, drills tight, laminations noted (lake silt)	31	300
	Till, very silty, drills tight	10	310
Pierre Formation:			
	Shale, olive-black	26	336

147-70-1ddd

Altitude: 1,596 feet

	Topsoil, silty, black	3	3
	Clay, silty, yellowish-brown	3	6
	Rocks, rough drilling	2	8
	Clay, silty, yellowish-brown, large amount of rocks	3	11
	Clay, silty, olive-gray, coal and shale fragments	10	21

147-70-4bba
Test hole 2629

Altitude: 1,618 feet

Glacial drift:			
	Till, silty to sandy, dusky-yellow, oxidized	21	21
	Till, silty to sandy, dark-olive-gray, moderately cohesive, slightly brittle, drills moderately tight	113	134
	Clay, silty, medium-gray, slightly calcareous, drills tight, (lake sediment)	11	145
	Till, silty, dark-olive-gray	7	152
Pierre Formation:			
	Shale, olive-black, brittle, noncalcareous	27	179

147-70-4bbb

Altitude: 1,617 feet

Glacial drift:			
	Till, sandy, yellow	10	10
	Sand, medium to coarse, brown	15	25
	Till, gray, unoxidized	180	205
Pierre Formation:			
	Shale, gray	5	210

147-70-5ada

Altitude: 1,617 feet

Glacial drift:			
	Till, yellow, oxidized	5	5
	Sand, medium to coarse, brown	15	20
	Till, gray, unoxidized	45	65
	Till, sandy, gray	100	165

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift--Continued:			
	Till, silty, gray	15	180
Pierre Formation:			
	Shale, gray	5	185

147-70-7bbb
Test hole 2663

Altitude: 1,630 feet

Glacial drift:			
	Topsoil, black	1	1
	Till, silty, moderate-yellow-brown, rocky	14	15
	Till, silty, olive-gray	145	160
	Till, silty, olive-gray to light-brownish-gray	28	188
Fox Hills Formation:			
	Clay, very sandy, light-greenish-gray, some sandstone	10	198
Pierre Formation:			
	Shale, olive-black	22	220

147-70-13ccc
Test hole 2478

Altitude: 1,630 feet

Glacial drift:			
	Topsoil, sandy loam, black	1	1
	Sand, fine to coarse, clayey, reddish-yellow, poorly sorted	4	5
	Till, sandy, olive-gray	56	61
	Till, sandy, olive-gray, fine to medium grained sand lenses	9	70
	Till, very sandy, olive-gray	40	110
Fox Hills Formation:			
	Shale, silty, light-olive-gray to olive-gray, calcareous	8	118
	Sandstone, fine to medium grained, dark-greenish-gray, calcareous	3	121
	Shale, silty, olive-gray	7	128
	Sandstone, fine grained, greenish-gray, indurated	5	133
	Shale, silty, olive-gray	4	137

147-70-19add
Test hole 2579

Altitude: 1,655 feet

Glacial drift:			
	Sand, fine grained, very silty, dusky-yellowish-brown	2	2
	Sand, medium to coarse, subangular to subrounded, dark-yellowish-brown	21	23
	Sand, fine to coarse, gravelly, very clayey, consists of 90 percent shale particles	72	95
	Till, very gravelly	10	105
	Till, silty, olive-gray, drills rough in places	125	230
	Sand, coarse grained, gravelly, very clayey	6	236
	Till, silty, olive-gray, with thin sand lenses	66	302
Pierre Formation:			
	Shale, olive-black, brittle	23	325

147-70-31aaa
Test hole 2477

Altitude: 1,700 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, sandy loam, dark-brown	1	1
	Sand, medium, light-reddish-brown, well-sorted, subangular, pitted, (windblown)	6	7
	Clay, silty and sandy, yellowish-gray	3	10
	Sand, medium, light-gray, well-sorted	2	12
	Till, sandy, olive-gray	29	41
	Sand, fine to medium, clayey, well-sorted	8	49
	Till, very sandy, olive-gray	49	98
	Till, silty, light-olive-gray to olive-green, very smooth	14	112
	Till, sandy, olive-green to dark-greenish-gray	20	132
	Till, very sandy, olive-gray, drills very tight	117	249
	Clay, silt, silty clay, and fine sandy clay intermixed and interbedded with till, drills uniform but tight	109	358
Pierre Formation:			
	Shale, olive-black, noncalcareous	29	387

147-71-6ddd
Test hole 2753

Altitude: 1,665 feet

Glacial drift:			
	Topsoil, black	1	1
	Sand, medium to coarse, poorly sorted	2	3
	Clay, silty to sandy, moderate-yellowish-brown	10	13
	Till, olive-gray	62	75
Fox Hills Formation:			
	Sandstone, medium-bluish-gray, noncalcareous	25	100

147-71-9dad
Darwin Tallman
(Log by A. B. Kamoni)

Altitude: 1,682 feet

Old well	18	18
Silt, gray	6	24
Sand, coarse	2	26
Sand, very fine	2	28

147-71-11bbc
(Log republished from Filaseta, 1946, p. 18)

Altitude: 1,690 feet

Clay, yellow	19	19
Clay, sandy	6	25
Clay, stoney, blue	5	30
Shale	32	62

147-71-19aaa
Test hole 2475

Altitude: 1,690 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty loam, black	1	1
	Till, silty to sandy, dusky-yellow, oxidized	11	12
	Till, silty, olive-gray	8	20
Fox Hills Formation:			
	Clay, sandy, olive-gray to light-gray	22	42

147-71-31bbb
Test hole 2640

Altitude: 1,693 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, sandy, brown	1	1
	Till, very silty to sandy, dusky-yellow, oxidized	11	12
	Till, very silty, olive-gray, drills easy	15	27
	Gravel, fine grained, sandy, subangular to subrounded	2	29
	Till, silty, olive-gray	33	62
Fox Hills Formation:			
	Sand, fine to medium, dark-greenish-gray, subrounded to rounded	11	73
	Clay, very sandy, dark-greenish-gray, noncalcareous	11	84

147-72-3bbb2
Test hole 2553

Altitude: 1,665 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, olive-black	1	1
	Till, very silty, dusky-yellow, oxidized	19	20
	Till, very silty, olive-gray	6	26
	Sand, fine to very fine	3	29
	Till, silty, olive-gray	26	55
	Sand, fine to very fine, olive-gray	12	67
	Till, silty, olive-gray	12	79
Fox Hills Formation:			
	Sandstone, consolidated	4	83

147-72-3cbb
Test hole 2660

Altitude: 1,641 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, black	1	1
	Till, silty to sandy, rocky, moderate-yellowish-brown, oxidized	3	4
	Sand, very fine to fine, silty	3	7
	Till, silty to sandy, rocky, moderate-yellowish-brown	18	25
	Sand, fine to medium, silty	1	26
	Till, very silty, olive-gray	3	29
	Sand, fine to very fine, silty	2	31
	Till, silty, olive-gray	12	43
	Sand, gravelly, angular to subrounded	4	47
	Till, olive-gray	7	54
	Clay, very sandy, grayish-olive-green, fairly calcareous, driller reports rocks (till)	9	63
	Gravel, medium, angular	5	68
	Clay, very sandy, grayish-olive-green	26	94
	Till, olive-gray	10	104
	Gravel, medium to coarse, rocky	8	112
	Clay, very sandy, grayish-olive-green, calcareous	3	115
	Gravel, coarse to very coarse, rocky, subangular to angular limestones, very clean, takes large amounts of water	25	140

147-72-5ccc
Test hole 2556

Altitude: 1,655 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, olive-black	1	1
	Sand, very clayey, dusky-yellow, oxidized	9	10
	Sand, fine to medium, mostly quartz	11	21
	Till, silty to gravelly, olive-gray	28	49
	Sand, fine to medium, subangular to subrounded, large amount of lignite	35	84
	Clay, silty, light-olive-gray, few sand lenses	26	110
Fox Hills Formation:			
	Clay, light-gray to very light-gray, drills tight, very calcareous	16	126

147-72-6bbb
Test hole 2557

Altitude: 1,640 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, sandy, olive-black	1	1
	Till, silty, dusky-yellow, rocky, oxidized	10	11
	Till, silty, olive-gray	26	37
	Sand, fine to medium grained	4	41
	Till, silty, olive-gray	3	44
	Sand, medium to coarse, gravelly, subangular to subrounded, rounded lignite cobbles present, lost circulation	72	116

147-72-12ddd
Test hole 2555

Altitude: 1,675 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, sandy, black	1	1
	Till, silty to sandy, yellowish-gray	5	6
	Sand, fine to very fine, clayey, dusky-yellow	5	11
	Sand, fine to very fine, silty, saturated	3	14
	Till, silty, olive-gray	7	21
	Sand, medium to coarse, large amount of shale	30	51
	Till, silty to sandy, olive-gray	35	86
Fox Hills Formation:			
	Clay, sandy, light-olive-gray, brittle	30	116

147-72-15ddd
Test hole 2639

Altitude: 1,673 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Sand, fine to coarse, dusky-brown	2	2
	Till, silty, dusky-yellow, drills rough, oxidized	4	6
	Till, silty, olive-gray, drills rough	14	20
	Clay, very silty, olive-gray, noncalcareous, drills tight	10	30
Fox Hills Formation:			
	Clay, very sandy, dark-greenish-gray to greenish-black, noncalcareous	22	52

147-72-16aaa
Test hole 2483

Altitude: 1,665 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, sandy loam, black	2	2
	Sand, fine to medium, brown, well-sorted, subrounded, did not take water	18	20
	Till, silty to very sandy, olive-gray	34	54
Fox Hills Formation:			
	Shale, very sandy, light-olive-gray, noncalcareous	20	74

147-72-17bcc
Test hole 2638

Altitude: 1,690 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, sandy, brown	1	1
	Sand, medium to coarse, gravelly, angular to subangular	13	14
	Sand, medium to coarse, gravelly, subangular to subrounded	3	17
	Till, silty to sandy, olive-gray	84	101
	Clay, silty, light-olive-gray to grayish-olive, calcareous, H_2S odor (lake sediment)	26	127
	Clay, very silty to sandy, light-olive-gray, slightly calcareous (lake sediment)	6	133
	Clay, silty, light-olive-gray	10	143
	Till, silty, olive-gray, lenses of fine gravel	21	164
	Clay, silty, olive-gray	17	181
	Till, silty, olive-gray	9	190
Fox Hills Formation:			
	Clay, very sandy, dark-greenish-gray, brittle, noncalcareous	41	231

147-72-23ddd
Test hole 2664

Altitude: 1,675 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, black	1	1
	Till, silty, moderate-yellowish-brown, oxidized	4	5
	Clay, smooth, highly plastic, moderate-yellowish-brown	4	9
	Clay, smooth, calcareous, olive-gray	6	15
	Gravel, fine, sandy	2	17
	Till, silty, olive-gray	11	28
	Till, olive-gray, gravel layers of angular limestone	7	35
	Till, very silty, olive-gray	23	58
Fox Hills Formation:			
	Sand, clayey, grayish-olive-green, speckled with mafic minerals, noncalcareous	22	80

147-73-1ccc
Test hole 2751

Altitude: 1,743 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, black	1	1
	Clay, silty to sandy, yellowish-brown	7	8
	Gravel, sandy to clayey	2	10
	Till, moderate-brown	10	20
	Till, silty, olive-gray	42	62
	Till, silty, medium-dark-gray	28	90
	Till, very silty, medium-dark-gray, contains interbedded oxidized layers	48	138
	Gravel, sandy and clayey, large amount of limestone	54	192
Fox Hills Formation:			
	Sandstone, medium-bluish-gray, drills hard	28	220

147-73-3ccc
Test hole 2511

Altitude: 1,880 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, black	1	1
	Till, very silty to moderately sandy, dark-yellowish-brown	15	16
	Gravel, medium to coarse, angular, clay intermixed	15	31
	Till, olive-gray	50	81
	Rock	.5	81.5
	Till	.5	82
	Rock	2	84
	Till, olive-gray	50	134
	Clay, very silty, olive-gray, soft	11	145
	Gravel, fine to coarse grained, sandy to silty, subangular to subrounded limestone	16	161
	Gravel, as above but less clay	14	175
	Clay, very silty, light-olive-gray, very calcareous	76	251
	Till, olive-gray, hard	21	272
	Till, very silty to moderately sandy, light-olive-brown, very hard, (second oxidized zone)	20	292
	Gravel, medium to coarse grained, angular to subangular, 95 percent limestone; drills rough, possibly cemented	23	315

148-68-10ada
Test hole 2458

Altitude: 1,555 feet

Glacial drift:			
	Topsoil, sandy loam, black	1	1
	Till, sandy, dusky-yellow	10	11
	Sand, medium to coarse, well-sorted	28	39
	Till, olive-gray	2	41
	Sand, medium to coarse	20	61
	Till, gravelly, olive-gray	38	99
Pierre Formation:			
	Shale, olive-gray	17	116

148-68-20bac
B. Krenzel
(Log by Norm Stai)

Altitude: 1,570 feet

	Clay, sandy, yellow	17	17
	Clay, gray, with rocks	98	115
	Gravel, medium to coarse	2	117
	Clay	3	120

148-68-26bcc
Test hole 2568

Altitude: 1,565 feet

Glacial drift:			
	Topsoil, silty, dusky-brown	1	1
	Till, very gravelly, yellowish-gray to dusky-yellow, oxidized	11	12
	Sand, medium to coarse, gravelly, silty to clayey, olive-black to olive-gray	10	22

148-68-26bcc--Continued

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift--Continued:			
	Clay, silty, olive-gray, drills tight--------------------	5	27
	Till, silty to gravelly, olive-gray, drills very rough---	80	107
	Clay, silty, olive-gray, drills tight--------------------	3	110
	Till, silty, olive-gray----------------------------------	46	156
Pierre Formation:			
	Shale, olive-black---------------------------------------	23	179

148-69-6baa
U.S. Bureau of Reclamation test hole AP27

	Topsoil---	1	1
	Clay--	4	5
	Glacial till--	19	24

148-69-7ada
Test hole 2566

Altitude: 1,600 feet

Glacial drift:			
	Sand, medium to very coarse, gravelly, subangular to subrounded---	18	18
	Till, silty, olive-gray----------------------------------	3	21
	Sand, fine to very fine, well-sorted, large amount of lignite present------------------------------------	4	25
	Till, silty, olive-gray----------------------------------	11	36
	Sand, fine to medium, well-sorted------------------------	6	42
	Till, silty, olive-gray, drills rough in places----------	128	170
Pierre Formation:			
	Shale, silty, olive-black, brittle-----------------------	19	189

148-69-13bcc
Test hole 2506

Altitude: 1,590 feet

Glacial drift:			
	Topsoil, silty, black------------------------------------	1	1
	Till, silty, dark-yellowish-brown, oxidized--------------	13	14
	Till, gravelly, olive-gray-------------------------------	53	67
	Clay, very silty, smooth, grayish-olive-green------------	9	76
	Clay, very silty, greenish-olive-green, very dry---------	20	96
	Till, moderately gravelly, olive-gray--------------------	56	152
Pierre Formation:			
	Shale, moderately hard, olive-black----------------------	16	168

148-69-28aaa
Test hole 2650

Altitude: 1,595 feet

Glacial drift:			
	Topsoil, black---	1	1
	Till, very silty, dusky-yellow to moderate-yellowish-brown, rocky (oxidized)-------------------------------	17	18
	Till, gravelly, olive-gray-------------------------------	38	56
	Till, silty to moderately gravelly, olive-gray, very hard	35	91

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift--Continued:			
	Gravel, fine to medium, angular	3	94
	Till, olive-gray, very hard	29	123
Pierre Formation:			
	Shale, olive-black, extremely hard, blocky, possibly fractured	3	126
	Shale, olive-black, hard, fissile	34	160

148-70-7ddd
Well A
(Log republished from Filaseta, 1946, p. 15)

Altitude: 1,610 feet

Topsoil, black	1	1
Clay, yellow	18	19
Boulders and clay	2	21
Clay, yellow	9	30
Clay, blue	4	34
Sand and gravel	1	35
Clay, blue	92	127
Boulders	1	128
Sand	32	160
Shale	4	164

148-70-8cbd
Well K
(Log republished from Filaseta, 1946, p. 16)

Altitude: 1,612 feet

Clay, yellow	24	24
Sand (dry)	5	29
Clay, blue	113	142
Shale	6	148

148-70-8cdc
Well D
(Log republished from Filaseta, 1946, p. 16)

Altitude: 1,610 feet

Topsoil, black	1	1
Clay, yellow	1	2
Gravel with some clay	8	10
Clay, yellow	22	32
Boulders and gravel	4	36
Clay, blue	97	133
Sand	12	145
Clay, blue	17	162
Shale	18	180

148-70-14ccc
Test hole 2649

Altitude: 1,600 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, black	1	1
	Till, silty to slightly sandy, moderate-yellowish-brown, (oxidized)	14	15
	Till, very silty, olive-gray	7	22
	Sand, fine to medium, very silty	4	26
	Till, silty, olive-gray	12	38
	Till, gravelly, olive-gray	15	53
	Till, silty, olive-gray, large amount of lignite	67	120
	Till, silty to slightly sandy, olive-gray	40	160
	Gravel, medium to coarse, angular	3	163
	Till, gravelly, olive-gray	7	170
Pierre Formation:			
	Shale, olive-gray to olive-black, noncalcareous	30	200

148-70-17bcb
Well I
(Log republished from Filaseta, 1946, p. 16)

Altitude: 1,615 feet

Topsoil, black	1	1
Clay, yellow	2	3
Sand and gravel (dry)	14	17
Clay, yellow	8	25
Sand (dry)	3	28
Clay, yellow	6	34
Clay, blue	18	52
Sand	5	57
Clay, blue	86	143
Sand (dry)	1	144
Clay, blue	13	157
Shale	70	227

148-70-18ada
Well H
(Log republished from Filaseta, 1946, p. 15)

Altitude: 1,616 feet

Topsoil, black	1	1
Clay, sandy, yellow	17	18
Clay, yellow	14	32
Clay, blue	4	36
Clay, blue, mixed with gravel	6	42
Clay, blue	103	145
Sand, mixed with clay	11	156
Shale	30	186

148-70-26ddd
Test hole 2627

Altitude: 1,604 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, very silty, dusky-brown	1	1
	Till, silty to sandy, dusky-yellow, oxidized	12	13
	Sand, fine to medium, subangular to subrounded, oxidized	2	15
	Till, silty, olive-gray	33	48
	Till, silty to slightly sandy, olive-gray	67	115
	Clay, slightly silty, light-olive-gray, calcareous	6	121
	Till, olive-gray	8	129
	Clay, silty, light-olive-gray	7	136
	Till, silty, olive-gray	13	149
	Till, silty, light-olive-gray to olive-gray	29	178
	Sand, medium to coarse, gravelly, drills rough	9	187
	Till, silty, olive-gray	8	195
Pierre Formation:			
	Shale, olive-black	26	221

148-70-32ccb

Altitude: 1,615 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Sand, medium to coarse, yellow	10	10
	Till, gray	60	70
	Sand and gravel, very silty, gray	100	170
	Gravel, medium to coarse	10	180
	Till, gray	30	210
	Gravel, medium to coarse, gray	10	220
	Till, gray	70	290
Pierre Formation:			
	Shale, gray	4	294

148-70-32daa

Altitude: 1,615 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Till, silty, light-gray	5	5
	Sand, fine to medium, well-sorted, brown	13	18
	Till, gray, unoxidized	177	195
Pierre Formation:			
	Shale, gray	5	200

148-70-32ddd

Altitude: 1,615 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Clay, silty, yellow	10	10
	Sand, medium to coarse, grayish-brown	10	20
	Till, silty, gray	75	95
	Till, sandy, gray	90	185
	Till, silty, gray	30	215
Pierre Formation:			
	Shale, gray	5	220

148-71-9bba
Test hole 2631

Altitude: 1,606 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, dusky-brown	1	1
	Till, silty to slightly sandy, yellowish-gray to moderate-olive-brown, oxidized	16	17
	Sand, medium to coarse, gravelly, subangular to subrounded	3	20
	Till, silty, olive-gray	51	71
	Till, silty to sandy, light-olive-gray to olive-gray	19	90
	Till, silty, olive-gray, drills tight	93	183
	Clay, silty, olive-gray to light-gray (lake sediment)	14	197
Pierre Formation:			
	Shale, silty, olive-black, noncalcareous	24	221

148-71-12bad
(Log republished from Filaseta, 1946, p. 20)

Altitude: 1,610 feet

Topsoil	1	1
Clay, yellow	5	6
Sand and gravel	4	10
Clay, yellow	21	31
Clay, blue	79	110
Sand	11	121
Clay, blue	55	176
Shale	44	220

148-71-12bbc
(Log republished from Filaseta, 1946, p. 19)

Altitude: 1,615 feet

Topsoil	1	1
Clay, yellow	14	15
Clay, yellow with gravel	11	26
Gravel	1	27
Sand	2	29
Clay, blue	90	119
Sand	17	136
Clay, blue	42	178
Shale	31	209

148-71-13ccc
Test hole 2630

Altitude: 1,605 feet

Glacial drift:			
	Topsoil, silty, black	1	1
	Till, silty to slightly sandy, yellowish-gray to dusky-yellow, oxidized	17	18
	Till, silty, olive-gray	28	46
	Sand, fine to coarse, subangular to subrounded	7	53
	Till, silty to sandy, olive-gray	22	75
	Till, silty, olive-gray	28	103
	Sand, medium to coarse, gravelly	3	106
	Till, silty, olive-gray	23	129

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift--Continued:			
	Clay, silty, olive-gray to dusky brown, calcareous, drills tight	3	132
	Till, silty, olive-gray	6	138
	Clay, silty, olive-gray to light-gray, calcareous	10	148
	Till, silty, olive-gray	10	158
	Clay, silty, olive-gray to light-gray	19	177
Pierre Formation:			
	Silt, clayey, olive-gray to dark-greenish-gray, noncalcareous	13	190
	Shale, olive-black, brittle, noncalcareous, drills tight	10	200

148-71-18aaa
Test hole 2474

Altitude: 1,610 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty loam, black	1	1
	Till, silty, dusky-yellow	11	12
	Till, sandy to silty, olive-gray, small sand layers present	36	48
	Till, silty, olive-gray	36	84
	Gravel, medium to coarse	2	86
	Till, silty, olive-gray	102	188
Pierre Formation:			
	Shale, olive-black, noncalcareous	22	210

148-71-19ccc
Test hole 2758

Altitude: 1,641 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, black	1	1
	Till, very silty to sandy, moderate-yellowish-brown	14	15
	Sand, coarse to very coarse	6	21
	Gravel, sandy, coarse to very coarse	13	34
Fox Hills Formation:			
	Siltstone, medium-light-gray	6	40

148-71-19cdd
Test hole 2760

Altitude: 1,637 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, black	1	1
	Gravel, sandy, coarse gravel, angular to subrounded, fairly well sorted, large amount of lignite in lower 5 ft	25	26
	Sand, gravelly, medium grained, subangular to subrounded, well sorted	46	72
	Till, olive-gray	13	85
Fox Hills Formation:			
	Sandstone, blue-green	15	100

148-71-24ddd
Test hole 2628

Altitude: 1,613 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty	1	1
	Till, silty to very sandy, dusky-yellow, oxidized	12	13
	Till, silty, olive-gray, sand and gravel lenses present	18	31
	Sand, medium to coarse grained, subangular to subrounded, moderately well-sorted	19	50
	Till, silty, olive-gray	5	55
	Sand, medium to coarse, gravelly, subrounded to rounded	38	93
	Till, silty to sandy, olive-gray	3	96
	Sand, medium to coarse, gravelly	2	98
	Till, silty to sandy	5	103
	Sand, medium to coarse, gravelly	7	110
	Clay, silty, light-olive-gray, slightly calcareous	24	134
	Till, silty, olive-gray, drills tight	29	163
	Clay, silty, light-olive-gray, calcareous, drills tight	26	189
Pierre Formation:			
	Clay, very silty, bluish-gray, noncalcareous	21	210

148-71-26ddd
Test hole 2662

Altitude: 1,600 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, black	1	1
	Till, silty, moderate-yellowish-brown	2	3
	Till, sandy, moderate-yellowish-brown	5	8
	Till, gravelly, olive-gray	17	25
Fox Hills Formation:			
	Clay, sandy, light-gray to greenish-gray	35	60

148-71-29bbb
Test hole 2755

Altitude: 1,635 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, black	1	1
	Till, moderate-yellowish-brown	9	10
Fox Hills Formation:			
	Siltstone, dark-gray, noncalcareous	30	40

148-71-29cbb
Walter Olschlager
(Log by A. B. Kamoni)

Altitude: 1,641 feet

Material	Thickness (feet)	Depth (feet)
Topsoil, black	2	2
Clay, sandy, yellow	6	8
Sand, green	10	18
Sandstone, green, hard	6	24
Sandstone, gray, hard	54	78
Sandstone, hard	2	80

148-71-32bbb
Test hole 2754

Altitude: 1,652 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, black	1	1
	Till, silty, moderate-yellowish-brown, oxidized	14	15
	Till, silty, olive-gray	41	56
	Sand, medium to very coarse, clayey	2	58
Fox Hills Formation:			
	Siltstone, medium-dark-gray	22	80

148-72-1cdd1
Ervin Keson
(Log by Schnell Inc.)

Altitude: 1,605 feet

Material	Thickness (feet)	Depth (feet)
Topsoil	1	1
Clay, sandy	6	7
Clay, streak of gravel	4	11
Till, boulders	8	19
Rock	.5	19.5
Till, boulders	6.5	26
Sand, fine to medium	2	28
Till, cobbles, gray	93	121
Rock	.3	121.3
Clay	38.7	160
Clay, gray	61	221
Clay, hard, dark-gray	46	267
Clay, medium hard, light-gray	33	300

148-72-6aac
Test hole 2764

Altitude: 1,615 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, black	1	1
	Sand, gravelly, poorly sorted, angular to subrounded	13	14
	Till, silty, olive-gray	18	32
Fox Hills Formation:			
	Siltstone, medium-gray, noncalcareous, well indurated	28	60

148-72-8bbc
Test hole 2551

Altitude: 1,620 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, black	1	1
	Till, very silty, yellow-gray to dusky-yellow	4	5
	Gravel, fine to medium, sandy, subangular to subrounded	33	38
	Till, very silty, olive-gray	48	86
Fox Hills Formation:			
	Clay, sandy, light-olive-gray to greenish-gray, noncalcareous	19	105

148-72-9ccc
Test hole 2550

Altitude: 1,620 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, black	1	1
	Till, silty, dusky-yellow, oxidized	9	10
	Sand, fine to medium, silty, oxidized	3	13
	Till, sandy, olive-gray	8	21
	Sand, gravelly, large amount of lignite	11	32
	Sand, fine to medium, mostly limestone	10	42
Fox Hills Formation:			
	Clay, sandy, light-olive-gray, noncalcareous	21	63

148-72-9ddc
Test hole pilot 3

Altitude: 1,610 feet

Glacial drift:			
	Topsoil, black	1	1
	Gravel, medium to coarse grained, sandy	3	4
	Till, silty, olive-gray	7	11
	Sand, medium to coarse, gravelly	5	16
	Till, silty to sandy, dark-gray	4	20
Fox Hills Formation:			
	Sandstone, medium-bluish-gray to dark-greenish-gray	20	40

148-72-10dcc
Test hole pilot 2

Altitude: 1,625 feet

Glacial drift:			
	Topsoil, black	1	1
	Till, silty, dark-yellowish-orange to olive-gray, oxidized	6	7
Fox Hills Formation:			
	Siltstone, moderate-brown to light-brown, noncalcareous, layers of sandstone present	13	20

148-72-10ddc
Test hole pilot 1

Altitude: 1,617 feet

Glacial drift:			
	Topsoil, sandy, black	1	1
	Clay, silty, dark-yellowish-orange to moderate-yellowish-brown	3	4
	Gravel, medium to coarse	3	7
	Till, olive-gray	5	12
Fox Hills Formation:			
	Siltstone, light-gray, drills hard	14	26
	Sandstone, medium-bluish-gray	14	40

148-72-11ddd
Test hole 2756

Altitude: 1,615 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, black	1	1
	Till, silty to sandy, moderate-yellowish-orange	13	14
	Till, silty, olive-gray	20	34
	Sand, medium to coarse, well-sorted, angular to rounded, takes water	35	69
	Till, silty, olive-gray	54	123
	Gravel, fine to medium, subangular to subrounded, moderately well-sorted, clay and silt lenses interbedded	71	194
	Till, silty to sandy, olive-gray	7	201
Fox Hills Formation:			
	Siltstone, medium-dark-gray, well indurated, hard drilling	39	240

148-72-15aba
Test hole 2484

Altitude: 1,615 feet

Glacial drift:			
	Topsoil, sandy clay, black	1	1
	Sand, medium to very coarse, gravelly, well-sorted, subangular to subrounded, limestone and granitic rocks are major components, large amount of lignite, took large amount of water--used drilling mud	99	100
Fox Hills Formation:			
	Sand, very fine, silty, light-olive-gray to greenish-gray, noncalcareous	26	126

148-72-20ddd
Test hole 2552

Altitude: 1,635 feet

Glacial drift:			
	Topsoil, sandy, brown	2	2
	Till, silty, yellowish-brown, oxidized	2	4
	Sand, very fine, gravelly, oxidized	6	10
Fox Hills Formation:			
	Sand, very fine, silty, dark-greenish-gray, noncalcareous	22	32

148-72-24cdd
Test hole 2759

Altitude: 1,648 feet

Glacial drift:			
	Topsoil, silty, grayish-black	1	1
	Till, silty, moderate-yellowish-brown	6	7
Fox Hills Formation:			
	Sandstone, grayish-blue, noncalcareous	13	20

148-72-26aaa
Test hole 2633

Altitude: 1,650 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Till, very silty, dusky-yellow to yellowish-gray, oxidized	13	13
	Sand, medium to coarse grained, poorly sorted, subangular	2	15
Fox Hills Formation:			
	Clay, sandy, moderate-yellowish-brown, noncalcareous, oxidized	4	19
	Clay, sandy, dark-greenish-gray, noncalcareous	12	31

148-72-26bbb
Test hole 2757

Altitude: 1,645 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, black	1	1
	Till, silty to sandy, moderate-yellowish-brown	12	13
	Till, very silty, olive-gray	3	16
Fox Hills Formation:			
	Sandstone, medium to coarse grained, grayish-blue	44	60

148-72-29ccc
Test hole 2635

Altitude: 1,649 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, dusky-brown	1	1
	Till, silty, dusky-yellow to yellowish-gray, oxidized	11	12
	Till, silty, olive-gray	31	43
Fox Hills Formation:			
	Clay, silty to very sandy, medium-bluish-gray to light-olive-gray, noncalcareous	20	63

148-72-34bbb
Test hole 2634

Altitude: 1,645 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, dusky-brown	1	1
	Till, very silty to sandy, dusky-yellow to yellowish-gray, oxidized	14	15
	Till, silty, olive-gray	6	21
	Sand, fine to medium grained, subangular to subrounded, around 5 percent lignite and shale particles	29	50
	Clay, silty, olive-gray, calcareous, drills tight	74	124
	Till, silty, olive-gray	5	129
	Clay, silty to sandy, dark-greenish-gray to greenish-black, intermixed with lenses of rocky till	24	153
Fox Hills Formation:			
	Clay, very sandy, dark-greenish-gray, noncalcareous	25	178

148-72-34dad
Test hole 2554

Altitude: 1,645 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, sandy, dark-brown	1	1
	Sand, silty, oxidized	9	10
	Sand, coarse grained, gravelly, very clayey	10	20
	Till, sandy, olive-gray	11	31
	Sand, fine to medium, subangular to subrounded, large amount of shale and lignite	2	33
	Till, gravelly, rocky	5	38
	Sand, fine to coarse, subangular to subrounded, large amount of shale and lignite	44	82
	Gravel, medium to coarse, sandy, large amount of lignite, drills very rough, lost circulation	34	116

148-72-36ddd
Test hole 2752

Altitude: 1,661 feet

Glacial drift:			
	Topsoil, black	1	1
	Clay, silty to sandy, moderate-yellowish-brown	1	2
	Gravel, sandy, mostly granitics	8	10
	Till, silty, olive-gray	45	55
Fox Hills Formation:			
	Siltstone, medium-light-gray to medium-gray, calcareous	25	80

148-73-14add
Test hole 2495

Altitude: 1,615 feet

Glacial drift:			
	Topsoil, silty loam, black	1	1
	Clay, silty, light-olive-gray to dusky-yellow	4	5
	Sand, very coarse, gravelly, large amount of lignite, moderately sorted, takes water	5	10
	Sand, medium to coarse, well-sorted	12	22
	Gravel, fine to medium, well-sorted, mostly limestone	5	27
Fox Hills Formation:			
	Clay, sandy, bluish-gray to brownish-gray	15	42

148-73-18ddd
Test hole 2496

Altitude: 1,645 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty loam, black	1	1
	Till, silty and very sandy, dusky-yellow to moderate-olive-brown	10	11
	Gravel, fine and medium, sandy, heavily iron stained, rough drilling	14	25
Fox Hills Formation (possibly Fort Union Formation):			
	Sand, very fine and fine, dark-greenish-gray and brown, salt and pepper appearance	17	42

148-73-25aaa
Test hole 2636

Altitude: 1,640 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Sand, fine grained, silty to clayey, dusky-brown	4	4
	Till, very silty, dusky-yellow to yellowish-gray, oxidized	7	11
	Clay, very silty, dark-olive-gray, very cohesive, drills tight (lake sediment)	31	42
	Till, silty, olive-gray	11	53
Fox Hills Formation:			
	Clay, silty, yellowish-brown, brittle, noncalcareous	5	58
	Shale, yellowish-gray to light-olive-gray, blocky, noncalcareous, drills tight	3	61
	Clay, sandy, dark-greenish-gray, noncalcareous	12	73

148-73-26bbb
Test hole 2637

Altitude: 1,632 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, dusky-brown	1	1
	Till, silty, dusky-yellow to moderate-olive-brown, oxidized	9	10
	Till, silty, dark-olive-gray, drills tight	11	21
Fox Hills Formation:			
	Sandstone, very fine to fine, dark-greenish-gray, indurated, noncalcareous	21	42

148-73-34bbb
Test hole 2558

Altitude: 1,660 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, black	3	3
	Till, very silty, moderate-olive-brown	5	8
	Sand, medium to coarse, gravelly, clay layers present, oxidized	14	22
	Till, silty, olive-gray	36	58
Fox Hills Formation:			
	Clay, very silty, olive-gray, moderately brittle, noncalcareous	16	74

148-73-35daa
Test hole 2497

Altitude: 1,635 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty clay, black	2	2
	Clay, very silty, light-gray and white, marly, calcareous	2	4
	Till, silty and sandy, olive-brown	8	12
	Boulder, granite	1	13
	Till, silty and sandy, olive-gray	12	25
	Sand, very fine to fine, well-sorted, subangular to subrounded, large amount of shale and lignite, took water	22	47
	Gravel, fine to coarse, sandy, moderately well-sorted, large amount of shale and lignite, took large amount of water	29	76
Fox Hills Formation:			
	Shale, very silty, light-gray	18	94

149-68-3ccb

Altitude: 1,562 feet

Glacial drift:			
	Till, yellow to gray, oxidized	20	20
	Till, gray, unoxidized	75	95
Pierre Formation:			
	Shale, dark-gray	15	110

149-68-3cdd
U.S. Bureau of Reclamation test hole AP4

Glacial till	9	9
Sand	6	15

149-68-3dda
U.S. Bureau of Reclamation test hole AP5

Topsoil	1	1
Sand	10	11
Silt	2	13
Sand and gravel	2	15

149-68-5aad

Altitude: 1,557 feet

Glacial drift:			
	Till, silty, yellow, oxidized	20	20
	Sand and gravel, gray, with considerable shale, about 20 percent clay	20	40
	Sand and gravel, brown, fairly clean	25	65
	Till, gray, unoxidized	30	95
	Sand, fine to medium, gray, with large amount of shale and coal	40	135
Pierre Formation:			
	Shale, dark-gray	4	139

149-68-5adb

Altitude: 1,560 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Till, silty, yellow to gray	15	15
	Sand, fine to medium, gray, with considerable coal and shale	50	65
	Till, gray, with shale gravel	25	90
	Sand and gravel, brown, considerable shale, 30 percent clay	30	120
Pierre Formation:			
	Shale, dark-gray	5	125

149-68-5dad

Altitude: 1,535 feet

Glacial drift:			
	Sand, fine to medium, silty, brown to gray	10	10
	Sand and gravel, clayey, gray	10	20
	Gravel and sand, gray, with considerable shale, 20 percent clay	10	30
	Gravel, silty, gray	10	40
	Till, silty, gray	15	55
Pierre Formation:			
	Shale, dark-gray	5	60

149-68-8aad

Altitude: 1,543 feet

Glacial drift:			
	Sand and gravel, fine to coarse sand to coarse gravel, brown, with some shale pebbles	15	15
	Till, gray, unoxidized	15	30
	Sand, medium to coarse, silty, gray, about 30 percent clay	44	74
Pierre Formation:			
	Shale, dark-gray	1	75

149-68-9bbb

Altitude: 1,548 feet

Glacial drift:			
	Sand and gravel, brown, clean	40	40
	Till, gray, limestone and shale pebbles, unoxidized	15	55
Pierre Formation:			
	Shale, dark-gray	4	59

149-68-11aad
U.S. Bureau of Reclamation test hole AP6

Topsoil	1	1
Clay, silty	2	3
Sand	6	9

149-68-16bbb

Altitude: 1,560 feet

Formation	Material	Thickness (feet)	Depth (feet)
Alluvium:			
	Clay, silty, black	10	10
Glacial drift:			
	Till, silty, gray, with shale and limestone pebbles	90	100
	Sand and gravel, clayey, gray, considerable coal and shale	25	125
	Sand and gravel, medium to coarse sand to fine gravel, gray	75	200
	Gravel and sand, gray, clean, considerable coal and shale	35	235
Pierre Formation:			
	Shale, dark-gray	5	240

149-68-17aaa
U.S. Bureau of Reclamation test hole AP3

	Clay, silty	5	5
	Sand, silty	5	10
	Glacial till	5	15

149-68-17bbc
U.S. Bureau of Reclamation test hole AP2

	Clay, silty	5	5
	Glacial till, clay	10	15

149-68-17ddd

Altitude: 1,552 feet

Lacustrine deposits:			
	Silt, yellow, with very fine sand, oxidized	5	5
	Silt, sandy, gray	15	20
Glacial drift:			
	Till, gray, limestone and shale pebbles	90	110
	Sand and gravel, silty, gray, 20 percent clay, considerable coal and shale	115	225
	Sand and gravel, brown, fairly well-sorted	20	245
	Gravel, brown, well-rounded, well-sorted	18	263
Pierre Formation:			
	Shale, dark-gray, weathered	6	269

149-68-21cbc
Test hole 2460

Altitude: 1,565 feet

Glacial drift:			
	Topsoil, sandy loam, black	1	1
	Till, sandy, dusky-yellow	16	17
	Till, silty, olive-gray	101	118
	Sand, medium to coarse, well-sorted, subangular to subrounded, large amount of shale and coal	140	258
Pierre Formation:			
	Shale, olive-green, noncalcareous	25	283

149-68-32dda
Test hole 2567

Altitude: 1,560 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, black	1	1
	Gravel, very sandy, poorly sorted	4	5
	Till, silty, yellowish-gray	3	8
	Till, silty, olive-gray	67	75
	Till, gravelly, fairly rocky	17	92
Pierre Formation:			
	Shale, olive-black	24	116

149-68-35bbc
Test hole 2459

Altitude: 1,560 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty loam, black	1	1
	Till, very sandy, dusky-yellow	3	4
	Sand, medium to coarse	2	6
	Till, dusky-yellow	4	10
	Sand, medium to coarse	3	13
	Till, sandy, dusky-yellow	6	19
	Till, olive-gray	64	83
	Sand, medium to coarse grained	3	86
	Till, sandy, olive-gray	20	106
Pierre Formation:			
	Shale, olive-gray, noncalcareous	20	126

149-69-3aaa
Test hole 2654

Altitude: 1,548 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, black	1	1
	Till, silty, dusky-yellow to moderate-brown, oxidized	19	20
	Till, very silty, olive-gray	34	54
	Clay, very sandy, noncalcareous, moderate-yellowish-brown, (Fox Hills erratic?)	5	59
	Till, silty, olive-gray	26	85
	Gravel, medium to coarse, fairly clean	7	92
	Till, olive-gray, hard	31	123
	Gravel, medium	3	126
	Till, silty, olive-gray	23	149
Pierre Formation:			
	Shale, olive-black, noncalcareous	11	160

149-69-4bcb

Altitude: 1,535 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Silt and sand, yellow	10	10
	Sand, fine to medium, gray	20	30
	Gravel, medium, brown, well-sorted	5	35
	Till, gray	5	40

149-69-5aaa

Altitude: 1,547 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Sand and gravel, brown, poorly sorted	20	20
	Sand and gravel, silty, gray, with considerable shale	20	40
	Till, gray, unoxidized	60	100
	Sand and gravel, gray-black, coal abundant, material angular	95	195
Pierre Formation:			
	Shale, dark-gray	9	204

149-69-5daa

Altitude: 1,570 feet

Glacial drift:			
	Till, silty, yellow-brown, oxidized	20	20
	Till, silty, gray, with shale pebbles, unoxidized	20	40
	Sand, silty, gray, contains considerable shale	175	215
	Gravel, medium to coarse, gray	35	250
	Gravel, gray, about 30 percent clay, contains shale and coal	65	315
Pierre Formation:			
	Shale, dark-gray	1	316

149-69-5ddd1

Altitude: 1,582 feet

Glacial drift:			
	Till, yellow to gray	25	25
	Sand, medium to coarse, silty, brown	5	30
	Till, silty to sandy, gray, shale pebbles	105	135
	Sand and gravel, gray, considerable coal and shale, 20 percent clay	60	195
	Sand and gravel, brown, clean, well-sorted	70	265
	Gravel, coarse, brown, clean	15	280
	Clay, sandy, gray	12	292
Pierre Formation:			
	Shale, gray	4	296

149-69-5ddd2
Test hole 2564

Altitude: 1,585 feet

Glacial drift:			
	Topsoil, silty, dusky-brown	1	1
	Till, silty and sandy, dusky-yellow, oxidized	9	10
	Sand, medium to coarse, gravelly, clayey, oxidized	10	20
	Till, silty to moderately sandy, olive-gray	95	115
	Sand, medium to coarse, poorly sorted, large amount of lignite	137	252

149-69-8aad

Altitude: 1,580 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Till, silty, yellow to gray	20	20
	Till, silty, gray	145	165
	Gravel, gray, considerable shale, about 20 percent clay	35	200
	Till, silty, gray	15	215
	Gravel, gray, mostly shale, about 20 percent clay	50	265
	Gravel, medium, gray, about 10 percent clay	15	280
	Till, gray	5	285
Pierre Formation:			
	Shale, gray	5	290

149-69-10bcc
Donald Newman
(Log by A. B. Kamoni)
Altitude: 1,577 feet

	Topsoil, black	2	2
	Clay, sandy, yellow	12	14
	Hardpan	2	16
	Sand, yellow	2	18
	Hardpan	.6	18.6
	Sand, coarse, yellow	2.4	21
	Sand, blue-gray, hard	8	29

149-69-11cca
Test hole 2655

Altitude: 1,577 feet

Glacial drift:			
	Topsoil, black	1	1
	Till, silty to sandy, gravelly, dusky-yellow, oxidized	14	15
	Till, silty, olive-gray, moderately rocky	121	136
	Sand, medium to coarse, fairly well-sorted, subangular to subrounded	15	151
	Clay, olive-gray	1	152
	Sand, very coarse, gravelly; subangular to subrounded, very clean, some lignite chips present	30	182
	Sand, medium to coarse, clayey	5	187
Pierre Formation:			
	Shale, grayish-olive-green	13	200

149-69-12bbc
Test hole 2462

Altitude: 1,545 feet

Glacial drift:			
	Topsoil, silty loam, black	1	1
	Sand, very coarse, gravelly	2	3
	Till, very sandy, dusky-yellow	8	11
	Till, silty, olive-gray	6	17
	Sand, medium to coarse	2	19
	Till, silty, olive-gray	103	122
	Sand, fine to medium, silty	9	131
	Till, olive-gray	29	160
	Sand, fine to medium, silty	4	164
	Clay, silty, olive-gray with greenish tint, hydrogen sulfide (H_2S) odor	6	170
	Gravel, fine to medium, clayey, poorly sorted, subrounded	15	185
Pierre Formation:			
	Shale, greenish-gray	25	210

149-69-13ccc
U.S. Bureau of Reclamation test hole AP1

Formation	Material	Thickness (feet)	Depth (feet)
	Topsoil	1	1
	Glacial till	14	15

149-69-20dda
Test hole 2565

Altitude: 1,595 feet

Glacial drift:			
	Till, silty to sandy, dusky-yellow, oxidized	20	20
	Till, very sandy, dusky-yellow, oxidized	11	31
	Till, silty, with a few sand lenses, olive-gray	67	98
	Gravel, sandy, poorly sorted, rough drilling	10	108
	Till, silty to gravelly, olive-gray	40	148
	Till, silty to sandy, olive-gray	9	157
	Sand, clayey, olive-gray, poorly sorted, large amount of lignite	23	180
	Gravel, sandy to clayey, large amount of shale and lignite	29	209
Pierre Formation:			
	Shale, olive-black	33	242

149-69-24bcc
Test hole 2463

Altitude: 1,575 feet

Glacial drift:			
	Topsoil, silty, black	1	1
	Till, silty, yellowish-brown	3	4
	Sand, medium to coarse	7	11
	Till, silty, yellowish-brown, rocky	19	30
	Till, olive-gray	14	44
	Sand, fine to medium, clayey	16	60
	Till, olive-gray	78	138
	Sand, medium to coarse, clayey, subangular to subrounded, shale and lignite chips present	14	152
	Sand, medium to coarse, subangular to subrounded, shale and lignite chips present	131	283
Pierre Formation:			
	Shale, olive-gray, noncalcareous	22	305

149-69-35adc
(Log republished from Filaseta, 1946, p. 20)

Altitude: 1,580 feet

	Topsoil	2	2
	Clay, yellow	6	8
	Clay, blue	174	182
	Shale	8	190

149-70-2aaa
Test hole 2466

Altitude: 1,595 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty loam, black	1	1
	Till, sandy to silty, dusky-yellow, oxidized	43	44
	Till, gravelly, dusky-yellow	7	51
	Sand, medium to coarse, fairly well-sorted, subangular to subrounded, very clean, takes water fast	19	70
	Gravel, medium to coarse, large amount of quartz and chert, clean	10	80
Fox Hills Formation:			
	Clay, sandy, light-bluish-gray	23	103
	Clay, sandy, grayish-olive, calcareous, indurated	12	115

149-70-3cbb

Altitude: 1,596 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Silt, dark-gray	5	5
	Till, light-gray	5	10
	Sand, gray, silty, chiefly limestone and shale	15	25
	Sand and gravel, silty	15	40
	Till, blue-gray	25	65
	Sand and gravel, silty, gray	95	160
	Gravel, brown, well-rounded, clean	30	190
Pierre Formation:			
	Shale, dark-gray	9	199

149-70-4daa1
City of Fessenden No. 2
(Log by C. A. Simpson & Sons)

Altitude: 1,590 feet

Material	Thickness (feet)	Depth (feet)
Topsoil	1	1
Clay, yellow, rocks	12	13
Clay, sandy, gray	22	35
Clay, sticky, gray	18	53
Clay, sandy	5	58
Sand, hard, brown	10	68
Clay, sandy	99	167
Clay, sandy, blue, with coal and gravel	3	170
Sand, muddy, with coal and clay	20	190
Sand, fine	3	193
Sand and gravel	13	206
Sand and gravel, did not seem to yield water	6	212
Shale	1	213

149-70-4daa2
City of Fessenden No. 1
(Log by G. Pross)

Altitude: 1,590 feet

Material	Thickness (feet)	Depth (feet)
Soil, black	1	1
Clay, yellow	19	20
Clay, sandy, blue	20	40
Sand, fine, bluish	65	105

Formation	Material	Thickness (feet)	Depth (feet)
	Sand and gravel, coarse	14	119
	Sand, fine, gray	33	152
	Sand, medium	5	157
	Gravel and sand	13	170

149-70-6ddd
Test hole 2656

Altitude: 1,600 feet

Glacial drift:			
	Topsoil, black	1	1
	Till, silty, moderate-brown	19	20
	Till, very silty, olive-gray	25	45
	Gravel, coarse to very coarse, rough drilling	14	59
	Till, olive-gray	1	60
	Sand, medium to coarse, silty	6	66
	Till, gravelly, olive-gray	13	79
	Gravel, coarse, angular	8	87
	Till, very silty, olive-gray	73	160
	Till, rocky, olive-black	27	187
	Gravel, rocky	3	190
	Till, olive-gray	5	195
	Gravel, rocky, angular	7	202
	Till, olive-gray	7	209
	Silt, light-gray	6	215
	Till, olive-gray with silt layers	20	235
Pierre Formation:			
	Shale, olive-black, noncalcareous	25	260

149-70-9daa1
Test hole 2503

Altitude: 1,610 feet

Glacial drift:			
	Topsoil, silty, black	1	1
	Till, very silty, dusky-yellow, oxidized, rocky	30	31
	Gravel, fine to medium, angular to subrounded	2	33
	Till, olive-gray	24	57
	Sand, medium to fine grained, silty, subrounded, large amount of lignite	12	69
	Sand, coarse grained, well-sorted, subrounded to rounded	36	105
	Sand, very coarse grained, gravelly, large amount of lignite	104	209
	Gravel, medium to very coarse, subangular, mostly limestone	28	237
	Gravel, with clay layers	26	263
Pierre Formation:			
	Shale, olive-black, noncalcareous	20	283

149-70-16ddd
Test hole 2504

Altitude: 1,597 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, black	1	1
	Till, silty, dusky-yellow, oxidized	11	12
	Till, rocky, olive-gray	11	23
	Till, with gravel layers	18	41
	Gravel, very clayey, angular	10	51
	Till, olive-gray, moderately hard, large amount of coal fragments	5	56
	Sand, fine to medium	2	58
	Till, silty, olive-gray, moderately hard	118	176
	Till, rocky and gravelly	13	189
	Till, rocky	67	256
Pierre Formation:			
	Shale, olive-black, noncalcareous	17	273

149-70-24bba
Test hole 2465

Altitude: 1,600 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty loam, black	1	1
	Till, very sandy, dusky-yellow	16	17
	Till, olive-gray	6	23
	Gravel, fine to medium	10	33
	Till, gravelly, olive-gray	3	36
	Gravel, medium to coarse, poorly sorted, large percentage of limestone pebbles	6	42
	Till, silty, olive-gray	102	144
	Gravel, medium to coarse, poorly sorted, limestone present in large amounts	9	153
	Till, gravelly, olive-gray	4	157
	Till, silty, olive-gray	48	205
	Gravel, fine to medium, poorly sorted, limestone and shale dominant minerals	14	219
	Till, silty, olive-gray	4	223
Pierre Formation:			
	Shale, olive-gray	29	252

149-71-4aba
Test hole 2468

Altitude: 1,620 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Till, sandy to silty, dusky-yellow	10	10
	Till, sandy to silty, dusky-yellow, very rocky	9	19
	Till, silty to slightly sandy, olive-gray, rocky	31	50
	Till, gravelly, olive-gray	10	60
Fox Hills Formation:			
	Clay, sandy, light-bluish-green, sandstone, fine grained, bluish-green, calcareous	34	94

149-71-6dcc
Test hole 2547

Altitude: 1,610 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, black	1	1
	Till, very silty to sandy, dusky-yellow to moderate-yellowish-brown, oxidized	14	15
	Till, silty, olive-gray, rocky	37	52
	Rocks	3	55
	Sand, medium to coarse, silty, fairly well-sorted, subrounded	40	95
	Clay, sandy, olive-gray	9	104
	Sand, medium to coarse, subrounded, large amount of lignite	13	117
	Clay, sandy, olive-gray	7	124
	Sand, medium to coarse, silty, subrounded, large amount of lignite	74	198
	Clay, very silty, olive-gray	6	204
	Sand, fine to medium, silty, not as much lignite as in sands above	15	219
	Gravel, fine to medium, very sandy, poorly sorted, subrounded to rounded, some chert present in larger grains	6	225
	Clay, sandy, olive-gray to light-brown, calcareous	87	312
Pierre Formation:			
	Shale, olive-black, very hard, bentonite streaks present	24	336

149-71-9ddd1
Test hole 2502

Altitude: 1,605 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, black	1	1
	Till, rocky, dusky-yellow, oxidized	32	33
	Till, rocky, olive-gray	9	42
Fox Hills Formation:			
	Clay, very silty, dark-greenish-gray, calcareous	21	63

149-71-19cca
Test hole 2648

Altitude: 1,613 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, sandy, black	1	1
	Till, very silty to slightly sandy, soft, moderate-olive-brown, oxidized	14	15
	Clay, olive-gray, very hard, contains organic specks throughout	12	27
	Sand, very fine to fine, moderately silty	12	39
	Till, silty, olive-gray	7	46
	Sand, medium, silty to clayey, large amounts of lignite	14	60
	Sand, medium, silty, numerous clay layers present	10	70
	Sand, medium, fairly silty, well-sorted, subrounded to subangular, large amount of lignite	29	99
	Silt, clayey to sandy, olive-gray, very calcareous	59	158
	Till, silty, olive-gray, hard to very hard	4	162
	Gravel, fine to medium, subrounded to rounded	9	171
	Silt, clayey to sandy, olive-gray, very soft, very calcareous	22	193

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift--Continued:			
	Till, silty, dark-olive-gray, fairly brittle, rocky------	18	211
Fox Hills Formation:			
	Clay, very silty to sandy, light-olive-gray to greenish-black, calcareous--	21	232
Pierre Formation:			
	Shale, olive-black, noncalcareous, brittle, bentonite layers present--	8	240

149-71-19ccb
Test hole 2657

Altitude: 1,617 feet

Glacial drift:			
	Topsoil, black--	1	1
	Till, very sandy, dusky-yellow, oxidized-----------------	13	14
	Till, very sandy, moderate-yellowish-brown, oxidized-----	6	20
	Sand, fine to medium, silty, large amount of lignite-----	16	36
	Clay, very silty, soft, olive-gray-----------------------	8	44
	Sand, fine to medium, clayey-----------------------------	13	57
	Silt, olive-gray to grayish-olive-green, calcareous, crumbly, intermixed with lake clay and coal layers----	52	109
	Till, olive-gray---	11	120
	Clay, very sandy and silty, olive-gray-------------------	11	131
	Till, olive-gray, rocky----------------------------------	54	185
Fox Hills Formation:			
	Clay, very sandy, light-gray to greenish-gray, calcareous	15	200

149-71-19cdd
Test hole 2548

Altitude: 1,610 feet

Glacial drift:			
	Sand, medium, well-sorted, angular to subangular (possibly wind blown)--------------------------------	4	4
	Clay, very silty, dusky-yellow---------------------------	7	11
	Till, very silty, olive-gray-----------------------------	18	29
	Clay, silty, olive-black, calcareous---------------------	17	46
	Sand, medium grained, subrounded, mostly quartz----------	16	62
	Silt, olive-gray to olive-black, very hard---------------	6	68
	Sand, fine to medium, very silty-------------------------	4	72
	Silt, sandy, olive-gray----------------------------------	6	78
	Sand, medium to coarse, gravelly, subrounded to rounded--	7	85
	Sand, fine, silty--	4	89
	Sand, fine to medium, very silty, some lignite present---	78	167
Fox Hills Formation:			
	Clay, very sandy, brownish-gray to greenish-gray---------	22	189

149-71-19cda
Test hole 2658

Altitude: 1,602 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, black	1	1
	Till, silty, yellowish-brown, rocky	6	7
	Sand, fine to medium	3	10
	Till, sandy, olive-gray, large amount of coal	10	20
	Clay, sandy, olive-gray	35	55
	Sand, fine to medium	19	74
	Clay, sandy to silty, olive-gray	16	90
	Sand, fine to medium	4	94
	Till, silty, olive-gray	47	141
	Clay, sandy to silty, light-gray to brownish-gray, large amount of coal present	18	159
	Sand, fine to medium	8	167
	Clay, sandy, olive-gray	3	170
	Sand, medium to coarse	3	173
Fox Hills Formation:			
	Clay, sandy to silty, light-gray to greenish-brownish-gray	17	200

149-71-20cac
Test hole 2501

Altitude: 1,597 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Till, very silty and sandy, light-olive-brown, oxidized	10	10
	Rock, siltstone	2	12
Fox Hills Formation:			
	Clay, silty, greenish-black, calcareous	20	32

149-71-21ccb
U.S. Bureau of Reclamation test hole AP24

Altitude: 1,592 feet

Topsoil	1	1
Clay	2	3
Sand	9	12

149-71-25dda
U.S. Bureau of Reclamation test hole AP25

Altitude: 1,585 feet

Topsoil	1	1
Glacial till	5	6
Clay (weathered shale)	3	9
Shale	3	12

149-71-27cbc
Test hole 2473

Altitude: 1,605 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty loam, black	1	1
	Till, silty, dusky-yellow	8	9
	Sand, fine grained, very silty	6	15
	Till, silty, olive-gray	4	19
Fox Hills Formation:			
	Clay, sandy, light-gray to greenish-gray, noncalcareous	23	42

149-71-31ccb
Test hole 2659

Altitude: 1,605 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, black	1	1
	Till, gravelly, dusky-yellow, oxidized	14	15
	Till, silty, olive-gray	34	49
	Gravel, medium, angular	2	51
	Till, silty, olive-gray	9	60
	Gravel, coarse to very coarse, rocky, angular to subangular, poorly sorted, coal noticed to be lacking	40	100
	Gravel, medium to coarse, sandy	29	129
	Till, silty, olive-gray	31	160

149-72-3aaa1
Test hole 2546

Altitude: 1,605 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, yellow	1	1
	Silt, sandy, dusky-yellow	5	6
	Silt, very sandy, dusky-yellow	12	18
	Sand, fine to medium, subangular to subrounded	28	46
	Gravel, fine to medium, sandy	6	52
	Till, silty, olive-gray	86	138
	Till, silty, olive-gray, very rocky	2	140
	Till, very silty, olive-gray	10	150
	Till, silty, olive-gray	52	202
	Gravel, angular, mostly limestone	4	206
Fox Hills Formation:			
	Clay, very sandy, light-bluish-green to green, hard, brittle layers of shale present	25	231

149-72-3aaa2
Test hole 2546A

Altitude: 1,605 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, sandy, yellow	1	1
	Silt, sandy, dusky-yellow	12	13
	Sand, fine to medium, fairly well-sorted	12	25
	Sand, fine to medium, gravelly	27	52
	Till, silty, olive-gray	11	63

149-72-6bbd
Boring No. 1

Altitude: 1,542 feet

Formation	Material	Thickness (feet)	Depth (feet)
	Ice	2	2
	Water	3.5	5.5
	Clay, silty loam, black, very soft	1	6.5
	Clay, silty, gray	2	8.5
	Sand, medium, gray	3	11.5
	Sand, gray, well-sorted	5.5	17
	Loam, silty, gray, sand lenses	4.5	21.5
	Clay, some gravel, gray, very stiff	4	25.5
	Clay, gravelly, brownish-gray	31	56.5
	Clay, silty, brownish-gray, a small amount of gravel	6	62.5
	Shale, brownish-gray, hard	17.5	80

149-72-6cad
Test hole 2545

Altitude: 1,600 feet

Glacial drift:			
	Topsoil, silty, dusky-brown	1	1
	Till, silty to sandy, dusky-yellow (oxidized)	11	12
	Till, silty, olive-gray	5	17
	Silt, clayey to sandy, olive-gray, soft to very brittle, slightly calcareous	55	72
Fox Hills Formation:			
	Sand, fine grained, dusky-blue-green, noncalcareous, glauconitic	13	85
	Sandstone, fine grained, dark-olive-green, drills rough	4	89
	Clay, sandy to silty, olive-gray to dusky-blue-green, noncalcareous	27	116

149-72-15bbb
Test hole 2549

Altitude: 1,590 feet

Glacial drift:			
	Topsoil, silty, olive-black	1	1
	Sand, fine to medium, oxidized	12	13
	Till, silty, olive-gray	34	47
	Silt, olive-gray, drills tight	5	52
	Silt, very sandy, olive-gray	11	63
	Till, silty, olive-gray	3	66
	Silt, sandy, olive-gray	6	72
	Till, silty, olive-gray	4	76
	Clay, very silty, olive-gray to olive-black	17	93
	Till, silty, olive-gray	117	210
Fox Hills Formation:			
	Sand, clayey, dark-greenish-gray, noncalcareous	21	231

149-72-18bcb
B. Werth
(Log by A. B. Kamoni)

Altitude: 1,620 feet

Formation	Material	Thickness (feet)	Depth (feet)
	Clay, sandy, yellow	16	16
	Sand, yellow	3	19
	Sand, gray	5	24
	Clay, blue	2	26

149-72-19ddd
Test hole 2494

Altitude: 1,620 feet

Glacial drift:			
	Topsoil, sandy loam, black	1	1
	Sand, fine grained, clayey, dusky-yellow	4	5
	Gravel, fine to medium, sandy, does not take any water	8	13
	Till, sandy, dark-greenish-gray	9	22
Fox Hills Formation:			
	Sand, fine grained, greenish-gray, calcareous, brown carbonaceous streaks	9	31

149-72-24ddb
Test hole 2661

Altitude: 1,608 feet

Glacial drift:			
	Topsoil, black	1	1
	Till, sandy, yellowish-brown	11	12
	Till, silty, olive-gray, rocky	6	18
	Gravel, fine to medium, sandy, large amounts of coal	6	24
	Sand, medium to coarse, clean, well-sorted	85	109
	Clay, sandy to silty, olive-gray	6	115
	Sand, medium to coarse, large amounts of coal	4	119
	Clay, sandy to silty, olive-gray	22	141
	Clay, very sandy, olive-gray	20	161
	Till, olive-gray	9	170
Pierre Formation:			
	Shale, olive-black	10	180

149-72-25bbb
Test hole 2500

Altitude: 1,600 feet

Glacial drift:			
	Till, sandy, dusky-yellow, oxidized	11	11
Fox Hills Formation:			
	Clay, sandy, dusky-blue-green, calcareous	10	21

149-72-33aaa
Test hole 2761

Altitude: 1,623 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, black	1	1
	Till, silty to very sandy, moderate-yellowish-brown	14	15
	Sand, medium to coarse grained	7	22
	Clay, very silty, olive-gray, very calcareous, laminated (lake clay)	32	54
	Till, silty, olive-gray	6	60
Fox Hills Formation:			
	Siltstone and sandstone, indurated	20	80

149-72-33cca
Test hole 2762

Altitude: 1,615 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, grayish-black	1	1
	Till, silty to sandy, moderate-yellowish-brown, oxidized	19	20
	Sand, medium to coarse, well-sorted, oxidized	2	22
Fox Hills Formation:			
	Sandstone, fine to medium grained	18	40

149-72-33dbb
Test hole 2763

Altitude: 1,615 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, grayish-black	1	1
	Clay, silty to sandy, moderate-yellowish-brown, oxidized	1	2
	Sand, medium to very coarse, subangular to subrounded	13	15
Fox Hills Formation:			
	Siltstone with sandstone layers, medium-light-gray	25	40

149-72-35ddd
Test hole 2632

Altitude: 1,602 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Clay, very silty, dusky-yellow to yellowish-gray, noncalcareous (lake sediment)	3	3
	Till, silty to sandy, dusky-yellow to yellowish-gray, oxidized	8	11
	Till, silty, dark-olive-gray, drills fairly easy	54	65
	Gravel, fine to medium grained, sandy, angular	3	68
	Till, silty, dark-olive-gray, drills rough	11	79
	Till, silty, dark-olive-gray, drills easy	128	207
Fox Hills Formation:			
	Silt, clayey, greenish-gray, noncalcareous	24	231

149-72-36dad
Test hole 2692

Altitude: 1,615 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, brown	1	1
	Silt, clayey, dark-yellowish-orange to moderate-yellowish-brown, oxidized	14	15
	Till, silty, olive-gray	15	30
	Cobbles and boulders	2	32
	Till, rocky, olive-gray	56	88
	Gravel, clayey to sandy	3	91
	Till, silty, olive-gray	56	147
	Silt, light-olive-gray	9	156
	Sand, very fine to fine grained	9	165
	Till, silty to sandy	4	169
	Gravel, medium to coarse, some granitic material	4	173
Fox Hills Formation:			
	Siltstone, light-gray, calcareous	10	183
	Sandstone, clayey, grayish-blue, noncalcareous, not cemented	23	206
	Sandstone, bluish-gray to greenish-gray, indurated	14	220

149-73-8add
Test hole 2493

Altitude: 1,590 feet

Glacial drift:			
	Topsoil, clay loam, black	1	1
Fox Hills Formation:			
	Siltstone, dark-olive-green, indurated, noncalcareous	10	11

149-73-9bbb1
Test hole 2492

Altitude: 1,610 feet

Glacial drift:			
	Topsoil, silty loam, black	1	1
	Till, sandy, dusky-yellow to reddish-brown	9	10
Fox Hills Formation:			
	Sand, fine to medium, reddish-brown, well-sorted, subrounded	11	21
	Sand, fine to medium, dark-greenish-gray	12	33
	Siltstone, medium-gray, very hard, noncalcareous	9	42

149-73-35bb
(Log by U.S. Bureau of Reclamation)

Altitude: 1,634 feet

Clay, silty, sandy, buff	15	15
Clay, silty, gray	5	20
Sand, fine, silty, buff	8	28
Shale, very silty, gray, grades into very fine indurated sand	6	34
Sand, very fine, silty, cemented	7	41
Shale, silty, firm, gray	4	45
Shale, very silty, firm, gray	9	54
Sand, fine, silty, buff	9	63
Shale, sandy, lignitic, black	1	64
Sand, fine to very fine, silty, light-gray, salt and pepper appearance	49	113
Shale, very silty, light-gray	37	150

150-68-14ccd
Test hole 2464

Altitude: 1,595 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Till, dusky-yellow	8	8
	Gravel, fine to medium, sandy, yellow	3	11
	Till, silty, dusky-yellow, rocky	7	18
	Till, olive-gray	90	108
Pierre Formation:			
	Shale, olive-gray	18	126

150-68-23bbd
Test hole 2461

Altitude: 1,585 feet

Glacial drift:			
	Topsoil, sandy loam, black	1	1
	Till, silty to sandy, dusky-yellow	10	11
	Till, olive-gray	7	18
	Gravel, clayey	18	36
	Till, olive-gray	37	73
	Boulder, granite, abandoned hole	2	75

150-68-29ddd
Test hole 2505

Altitude: 1,570 feet

Glacial drift:			
	Topsoil, silty, black	1	1
	Till, very silty and gravelly, dusky-yellow (oxidized)	18	19
	Sand, very coarse to medium grained, gravelly, very silty (oxidized)	15	34
	Till, silty, olive-gray, rocky, soft	8	42
	Till, silty, olive-gray, moderately hard, rocky	61	103
	Gravel, very fine grained, angular to subangular, mostly limestone pebbles	5	108
	Till, silty, olive-gray	17	125
	Till, silty, olive-gray, with gravel layers and rocks	50	175
	Gravel, cemented	3	178
	Till, silty, olive-gray	6	184
Pierre Formation:			
	Shale, olive-black	15	199

150-69-4bad

Altitude: 1,530 feet

	Clay, yellow	10	10
	Clay, blue	82	92
	Shale	8	100

150-69-20aaa
Test hole 2623

Altitude: 1,587 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Till, silty, dusky-yellow, oxidized	16	16
	Till, silty, olive-gray	5	21
	Sand, medium to coarse grained, subangular to subrounded, drills extremely rough	2	23
	Till, silty, olive-gray	2	25
	Sand, fine to medium, subangular to subrounded	3	28
	Till, silty, olive-gray	1	29
	Sand, fine to medium	2	31
	Sand, fine to medium, subangular to subrounded	14	45
	Till, silty, olive-gray, very rough drilling, contains few gravel lenses	72	117
	Gravel, fine to medium grained, drills rough	4	121
	Till, olive-gray	1	122
	Gravel, fine to medium, drills very rough	4	126
	Till, silty, olive-gray	17	143
	Till, silty, olive-gray, contains small sand lenses, drills very rough	23	166
	Till, silty, olive-gray, drills rough	20	186
Pierre Formation:			
	Shale, olive-black, noncalcareous, drills tight	35	221

150-69-24dcc
Test hole 2653

Altitude: 1,580 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, black	1	1
	Till, silty, dusky-yellow, rocky, oxidized	17	18
	Gravel, fine to medium, angular	2	20
	Till, silty, olive-gray	6	26
	Gravel, fine to medium, subangular to subrounded, some shale gravel present	10	36
	Till, silty to sandy, olive-gray	68	104
	Gravel, medium to coarse, subangular to subrounded	10	114
	Till, silty, olive-black	31	155
	Till, silty, olive-gray, very rocky	4	159
Pierre Formation:			
	Shale, olive-black, hard, blocky, noncalcareous	21	180

150-69-29ddd

Altitude: 1,555 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Till, silty, yellow, oxidized	5	5
	Sand and gravel, brown, considerable shale, poorly sorted	25	30
	Sand and gravel, silty, gray, considerable shale	10	40
	Till, gray	35	75
Pierre Formation:			
	Shale, dark-gray	15	90

150-69-32aaa
Test hole 2563

Altitude: 1,560 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, dusky-brown	1	1
	Sand, medium to coarse, gravelly, oxidized	9	10
	Sand, medium to coarse, saturated	11	21
	Till, gravelly, olive-gray	21	42

150-69-32ada

Altitude: 1,554 feet

Glacial drift:			
	Clay, silty, black	3	3
	Sand, medium to coarse, brown	8	11
	Till, gray	19	30
	Gravel and sand, silty, gray	10	40
Pierre Formation:			
	Shale, dark-gray	10	50

150-69-32daa

Altitude: 1,548 feet

Glacial drift:			
	Sand, medium to coarse, brown	5	5
	Sand, silty, gray, considerable shale	25	30
	Till, gray	30	60
Pierre Formation:			
	Shale, dark-gray	20	80

150-70-4bbb
Test hole 2471

Altitude: 1,595 feet

Glacial drift:			
	Topsoil, silty, black	1	1
	Till, dusky-yellow	11	12
	Till, olive-gray	11	23
Pierre Formation:			
	Shale, olive-black, noncalcareous	19	42

150-70-8dcc
Test hole 2472

Altitude: 1,570 feet

Glacial drift:			
	Topsoil, silty loam, black	1	1
	Till, sandy, dusky-yellow	8	9
	Till, silty, olive-gray	23	32
	Rocks and gravel	3	35
	Sand, medium to coarse, moderately well-sorted, subangular to subrounded	5	40
	Till, silty, olive-gray	45	85
Pierre Formation:			
	Clay, sandy, bluish-green to light-gray, noncalcareous	30	115

150-70-22ccb

Altitude: 1,598 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Till, silty, dark-brown, secondary calcareous deposition present	5	5
	Till, silty, yellow	15	20
	Till, yellow to gray	20	40
	Till, gray, unoxidized	10	50
	Sand, coarse, brown, fairly clean	10	60
	Till, gray	11	71

150-70-22ccc

Altitude: 1,575 feet

Glacial drift:			
	Clay, silty, brown	5	5
	Sand, fine to medium, gray, well-sorted	10	15
	Gravel, silty, yellow	15	30
	Sand and gravel, brown, well-sorted, clean	20	50
	Till, sandy, gray	10	60
	Sand and gravel, gray, 50 percent clay	100	160
	Till, sandy, gray	20	180
	Gravel, gray, mostly shale, 20 percent clay	110	290
Pierre Formation:			
	Shale, dark-gray	5	295

150-70-27bbc

Altitude: 1,535 feet

Glacial drift:			
	Clay, silty, gray, contains fossil shells	10	10
	Sand, medium to coarse, brown	10	20
	Sand and gravel, gray, clean	28	48
	Till, gray, sand and gravel intermixed	162	210
Pierre Formation:			
	Shale, dark-gray	2	212

150-70-27bcb

Altitude: 1,535 feet

Glacial drift:			
	Sand, fine, dark-gray	5	5
	Sand, brown, with poorly sorted limestone and shale pebbles	5	10
	Gravel, gray, many rounded shale pebbles	10	20
	Till, sandy, gray	10	30

150-70-27bcc

Altitude: 1,581 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Till, silty, yellow, oxidized	35	35
	Till, gray, unoxidized	125	160
	Gravel, very silty, gray, large amount of shale	110	270
	Sand and gravel, very silty, gray, large amount of shale	60	330
Pierre Formation:			
	Shale, dark-gray	10	340

150-70-28aaa

Altitude: 1,570 feet

Glacial drift:			
	Sand and gravel, medium sand grading into fine gravel, brown	20	20
	Gravel, very coarse, gray	16	36
	Till, gray, unoxidized	4	40

150-70-28abb

Altitude: 1,541 feet

Glacial drift:			
	Sand, very fine, silty, gray	5	5
	Sand, medium to coarse, brown	10	15
	Gravel, fine to medium, brown	15	30

150-70-28ada

Altitude: 1,560 feet

Glacial drift:			
	Sand, very fine grading into coarse, brown	15	15
	Sand and gravel, gray, shale and coal present	15	30
	Sand, medium to coarse, brown	10	40
	Till, gravelly, gray	5	45

150-70-28ccc
Test hole 2467

Altitude: 1,595 feet

Glacial drift:			
	Topsoil, silty loam, black	1	1
	Sand, fine to medium	2	3
	Till, sandy, dusky-yellow	28	31
	Till, silty, olive-gray	4	35
	Sand, very fine to medium, fairly well-sorted	5	40
	Till, silty, olive-gray	9	49
	Till, sandy to silty, olive-gray	251	300
	Gravel, fine to medium, subrounded, mostly limestone	6	306
	Till, olive-gray	21	327
Pierre Formation:			
	Shale, olive-black, noncalcareous	20	347

150-70-31cdd
Test hole 2562

Altitude: 1,600 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, clayey, dusky-brown	1	1
	Till, silty, dusky-yellow to moderate-olive-brown	30	31
	Till, silty, olive-gray	81	112
	Silt, clayey, olive-gray, drills tight	6	118
	Till, silty, olive-gray	39	157
	Sand, medium to coarse, gravelly, large amount of lignite and shale present, subangular to subrounded	172	329
Pierre Formation:			
	Shale, olive-black, noncalcareous	25	354

150-70-33add

Altitude: 1,590 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Till, yellow, oxidized	16	16
	Till, blue-gray, unoxidized, sand and gravel lenses present throughout	140	156
	Sand, very silty, blue-gray, chiefly shale and coal	14	170
	Gravel, sandy, gray, 10 percent clay	50	220
	Sand and gravel, gray to brown, fairly clean	15	235
	Gravel and sand, gray, 20 percent clay	5	240
	Gravel and sand, gray to brown, fairly clean	26	266
	Gravel and sand, silty, 20 percent clay	35	301
Pierre Formation:			
	Shale, dark-gray	15	316

150-70-34bbb

Altitude: 1,588 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Sand, silty, yellow	5	5
	Silt, yellow to gray	15	20
	Till, gray, unoxidized	120	140
	Sand and gravel, gray, with about 30 percent clay and silt	125	265
	Till, gray	20	285
	Shale, sand, gray	45	330
	Till, gray	20	350
	Gravel, silty and clayey, gray	15	365
Pierre Formation:			
	Shale, dark-gray	1	366

150-70-34ccc

Altitude: 1,595 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Till, sandy, yellow	16	16
	Till, gray	174	190
	Sand and gravel, clayey, gray, chiefly shale and lignite	95	285
	Gravel and sand, clayey, gray	25	310
	Sand and gravel, silty, gray	22	332
Pierre Formation:			
	Shale, dark-gray	13	345

150-70-36aaa
Test hole 2624

Altitude: 1,586 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, black	1	1
	Till, very silty to slightly sandy, dusky-yellow to moderate-olive-brown, oxidized	24	25
	Till, silty, olive-gray, drills moderately rough	13	38
	Till, silty to very sandy, olive-gray	4	42
	Sand, fine to medium	2	44
	Gravel, fine to medium grained, subangular to subrounded, drills rough	3	47
	Till, silty, dark-olive-gray, drills moderately rough	45	92
	Sand, medium to coarse, gravelly, drills rough	7	99
	Till, silty, olive-gray	4	103
	Sand, medium to coarse grained, gravelly, large amount of shale and lignite present; subangular to subrounded gravel, mostly angular	34	137
Pierre Formation:			
	Clay, very sandy, light-gray, noncalcareous, H_2S odor	16	153
	Clay, silty to very sandy, fine sand lenses present, light-gray to green, noncalcareous, H_2S odor	23	176
	Clay, silty to very sandy, light-gray to green, drills tight	13	189

150-71-4ddd
Test hole 2470

Altitude: 1,580 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, sandy loam, black	1	1
	Till, silty, dusky-yellow, oxidized	10	11
	Till, silty to sandy, olive-gray	4	15
	Sand, fine to medium grained	3	18
	Till, silty, olive-gray	34	52
	Clay, sandy, light-greenish-gray, noncalcareous	4	56
	Till, gravelly, olive-gray	57	113
	Till, very gravelly, olive-gray	44	157
	Till, silty, olive-gray	19	176
	Rock, granite	1	177
	Sand, coarse to very coarse, gravelly, subrounded to subangular, large amount of coal and shale, moderately silty	73	250
	Gravel, sandy, fine to medium, subrounded, poorly sorted, large amount of coal	32	282
Pierre Formation:			
	Shale, olive-black, noncalcareous	22	304

150-71-8bbb
Test hole 2485

Altitude: 1,610 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, sandy loam, black	1	1
	Sand, fine to medium, light-brown	4	5
	Till, very sandy, dusky-yellow	8	13
	Till, very sandy, rocky, moderate-olive-brown	11	24
	Till, very sandy, very rocky, olive-gray	29	53
	Till, olive-gray	3	56
	Till, silty to very sandy, very rocky, olive-gray, rough drilling	40	96

150-71-8bbb--Continued

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift--Continued:			
	Clay, silty with interbedded lenses of silt, some sand lenses, light-gray to olive-gray	39	135
	Gravel, fine to coarse, very sandy, brownish color, large amount of chert and shale, takes water	46	181
	Gravel, fine to coarse, clayey, poorly sorted	6	187
	Till, silty to sandy, olive-gray, moderately rough drilling	24	211
Fox Hills Formation:			
	Shale, silty, light-olive-gray, calcareous	9	220
	Shale, light and medium-gray to dark-greenish-gray, noncalcareous	7	227
	Sand, very fine, clayey, dark-greenish-gray	7	234
	Shale, silty with very fine sand, light-gray, slightly calcareous	11	245
Pierre Formation:			
	Clay, olive-black, noncalcareous	9	254
	Shale, olive-black, fissile, noncalcareous	9	263

150-71-9bbd
Great Northern R. R.
(Log by C. M. Wick)

Altitude: 1,597 feet

Clay	18	18
Gravel and sand	8	26
Clay, gray	20	46
Clay, very hard	10	56
Clay, hard, with boulders	14	70
Clay, blue	16	86
Clay, hard, sandy	20	106
Clay, blue	25	131
Clay, sandy	10	141
Shale, hard (clay)	5	146
Sand (quicksand)	10	156
Fine sand	5	161
Sand and clay	14	175
Gravel, sandy	4	179

150-71-11abb
Test hole 2561

Altitude: 1,600 feet

Glacial drift:			
	Topsoil, silty, dusky-yellowish-brown	1	1
	Till, silty, dusky-yellow, oxidized	36	37
	Till, silty, olive-gray, contains few sand lenses	26	63
	Sand, fine to medium, clayey	12	75
	Till, silty, olive-gray	20	95
	Till, gravelly, olive-gray	21	116
	Till, silty, olive-gray	59	175
	Till, silty to gravelly, olive-gray	17	192
	Silt, olive-gray, drills tight	7	199
	Till, silty, olive-gray	6	205
Pierre Formation:			
	Shale, silty, olive-black	26	231

150-71-16ccc
Test hole 2559

Altitude: 1,595 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, sandy, olive-black	1	1
	Till, sandy to gravelly, dusky-yellow, oxidized	22	23
	Till, silty, olive-gray	7	30
	Gravel, sandy	2	32
	Till, silty to sandy, olive-gray	10	42
	Sand, medium to coarse, gravelly	8	50
	Till, silty, olive-gray	38	88
	Gravel, sandy, subrounded to subangular, drills rough	8	96
	Till, silty, olive-gray	53	149
	Till, sandy to gravelly, drills rough	29	178
	Gravel, sandy, subangular to subrounded	13	191
	Sand, poorly sorted, gravelly, subangular to subrounded, large amount of lignite present	101	292
Pierre Formation:			
	Shale, silty, olive-black	23	315

150-71-17cdb
Frank Weist
(Log by Russell Drilling Co.)

Altitude: 1,602 feet

Material	Thickness (feet)	Depth (feet)
Clay, sandy, yellow	14	14
Sand, silt, fine gravel	53	67
Clay, blue	78	145
Gravel and sand	18	163
Clay, blue	5	168

150-71-26abb
Test hole 2469

Altitude: 1,585 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, sandy, yellowish-brown	2	2
	Sand, medium to coarse, subangular to subrounded	27	29
	Till, silty, gravelly, olive-gray	13	42
	Gravel, medium to coarse, mostly shale and limestone	5	47
	Till, silty to sandy, very gravelly, olive-gray	26	73
	Sand, medium to coarse, fairly well-sorted	5	78
	Till, gravelly, olive-gray	8	86
	Gravel, fine, medium to coarse, poorly sorted	8	94
	Rock--granite	3	97
	Till, silty, olive-gray	49	146
	Sand, coarse to very coarse	52	198
	Gravel, fine to medium, poorly sorted	12	210
	Clay, gravelly, rocky	8	218
	Sandstone, fine to medium grained, bluish-green	2	220
	Gravel, fine to medium, subrounded, moderately well-sorted	11	231
	Clay, silty, olive-gray, heavy H_2S smell (lacustrine)	2	233
	Gravel, fine to medium, subangular, poorly sorted, drilled like cemented	26	259
Fox Hills Formation:			
	Clay, sandy, light-bluish-gray to light-brown	24	283

150-71-29aab
Test hole 2560

Altitude: 1,600 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, clayey, black	1	1
	Till, silty to sandy, dusky-yellow to moderate-olive-brown	20	21
	Till, silty, olive-gray	21	42
	Sand, medium to very coarse, gravelly	6	48
	Till, silty, olive-gray	6	54
	Sand, medium to very coarse, gravelly, contains chalcedony	9	63
	Gravel, sandy, lignite, shale and chalcedony present	23	86
	Till, silty, olive-gray	10	96
	Sand, medium to very coarse, gravelly, subangular to subrounded	51	147

150-72-6bbb
Test hole 1090

Altitude: 1,610 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, black	2	2
	Clay, gray, sandy	2	4
	Sand, medium to coarse	6	10
	Till, yellow, oxidized	11	21
	Till, gray, unoxidized	53	74
	Sand, medium to coarse, clayey	15	89
	Till, gray	47	136
	Gravel, fine to medium	19	155
	Gravel, coarse, cemented	49	204
Pierre Formation:			
	Shale, gray	6	210

150-72-6dad
Test hole 2490

Altitude: 1,570 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty loam, black	1	1
	Gravel, fine, sandy, interbedded with silt and clay	4	5
	Marl, clayey, white; highly fossiliferous	3	8
	Sand, fine, gray, well-sorted	4	12
	Sand, medium, light-gray, does not take water	8	20
	Till, sandy, olive-gray, fairly rocky	66	86
	Till, extremely gravelly, olive-gray, rough drilling	11	97
	Till, sandy, olive-gray, few sand lenses throughout	32	129
	Till, extremely gravelly, olive-gray, rough drilling	4	133
	Till, silty, olive-gray, rocky	17	150
	Silt, olive-gray, soft, calcareous	5	155
	Till, sandy, olive-gray	4	159
	Sand, fine, silty	5	164
	Boulder, granite	2	166
	Silt, sandy, light-olive-gray, highly calcareous	5	171
	Till, silty, olive-gray	4	175
	Sand, fine, light-olive-gray	3	178
	Till, sandy, olive-gray, very smooth	29	207
	Till, silty, olive-gray	35	242
Pierre Formation:			
	Shale, olive-black, noncalcareous, very tightly consolidated	10	252

150-72-7ccc
Test hole 1089

Altitude: 1,604 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Till, yellow, oxidized	11	11
	Till, gray, unoxidized	93	104
	Sand, medium to coarse, gravelly	6	110
	Gravel, fine, sandy	40	150
	Till, gray	19	169
	Gravel, fine, sandy, very silty	18	187
	Till, gray	87	274
Pierre Formation:			
	Shale, gray	16	290

150-72-11adb
Alice Goldade
(Log by Russell Drilling Co.)

Altitude: 1,620 feet

	Clay, yellow	9	9
	Sand, gravel, silty	35	44
	Clay, blue, streaked with gravel	151	195
	Sand, fine	5	200
	Gravel streaked with clay	10	210

150-72-12dda
Test hole 2486

Altitude: 1,597 feet

Glacial drift:			
	Topsoil, clay, dark-brown	1	1
	Till, silty and very sandy, dusky-yellow	11	12
	Till, silty and sandy, olive-gray, fairly rocky	41	53
	Till, silty to moderately sandy, olive-gray	96	149
	Gravel, fine to medium, sandy, poorly sorted, moderately rough drilling, does not take water	10	159
	Clay, silty and sandy, olive-gray	5	164
	Gravel, fine to coarse, moderately sandy, subangular to subrounded, moderately well-sorted, large amount of shale particles, did not take water	8	172
	Till, silty and sandy, olive-gray	13	185
	Gravel, fine to medium, clayey, poorly sorted, rough drilling	27	212
	Till, silty, olive-gray	74	286
Pierre Formation:			
	Shale, olive-black, noncalcareous	19	305

150-72-15aaa
Test hole 2665

Altitude: 1,605 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, black	1	1
	Till, very gravelly and rocky, moderate-yellow-brown	11	12
	Till, very silty, olive-gray, very rocky	64	76
	Till, very silty, olive-gray, extremely rocky, rough drilling	5	81
	Till, silty, olive-gray, hard	172	253
Pierre Formation:			
	Shale, olive-black, noncalcareous	27	280

150-72-20bcc
Test hole 2489

Altitude: 1,590 feet

Glacial drift:			
	Topsoil, loam, gray	1	1
	Till, very sandy, yellowish-gray to moderate-olive-brown, rough drilling	18	19
	Till, sandy, extremely rocky	55	74

150-72-23ada
Test hole 2487

Altitude: 1,520 feet

Glacial drift:			
	Topsoil, silty loam, black	1	1
	Clay, silt and sand, dusky-yellow, interbedded	3	4
	Cobbles and boulders, rough drilling	4	8
	Sand, medium and coarse, moderately well-sorted, takes water	4	12
	Sand, medium and coarse, interbedded clay and silt	3	15
	Till, silty and sandy, very rocky, olive-gray	98	113

150-72-23ddd
Test hole 2488

Altitude: 1,605 feet

Glacial drift:			
	Topsoil, loam, black	1	1
	Till, sandy, yellowish-gray to dusky-yellow	13	14
	Till, silty and sandy, moderate-olive-brown	8	22
	Sand, medium, gray, well-sorted, subrounded	3	25
	Till, sandy, olive-gray	23	48
	Boulder, sandstone	2	50
	Till, silty to sandy, olive-gray, rocky	55	105
	Sand, fine to coarse, clayey, does not take water	27	132
	Silt and sandy clay, olive-gray to dark-greenish-gray, drills tight	22	154
	Till, sandy, olive-gray	6	160
	Sand, fine and medium, silty, medium-gray	15	175
	Till, sandy, olive-gray to dark-greenish-gray	16	191
Fox Hills Formation:			
	Sand, fine, dark-greenish-gray, well-sorted	30	221

150-72-28baa
Harvey test hole 62-1
(Log by C. A. Simpson & Sons)

Altitude: 1,526 feet

Formation	Material	Thickness (feet)	Depth (feet)
	Topsoil	1	1
	Sand, clayey, gray	7	8
	Sand	6	14
	Clay, sandy, gray	5	19
	Sand, gray	4	23
	Clay, sandy, gray	2	25
	Sand, fine	5	30
	Sand, coarse, gravelly	9.5	39.5
	Sand, fine, clayey, coal present	.5	40
	Sand, coarse, gravelly, clayey	5	45
	Sand, gravel, pebbles, clayey	5	50
	Clay, gravelly	.5	50.5
	Gravel, coarse	1.5	52
	Gravel, very clayey	1	53
	Sand, coarse	3	56
	Sand and gravel, clayey	5	61
	Clay, sandy	30	91

150-72-28bab2
Harvey test hole 62-2
(Log by C. A. Simpson & Sons)

Altitude: 1,525 feet

Material	Thickness (feet)	Depth (feet)
Topsoil	2	2
Clay, gray, soft	1	3
Sand	16	19
Sand, gravel, stones	10	29
Sand, gravel, stones, clayey	8	37
Sand, gravel, cobbles, clayey	17	54
Sand, gravel, boulders	22	76

150-72-28bac
Harvey test hole 60-3
(Log by C. A. Simpson & Sons)

Altitude: 1,525 feet

Material	Thickness (feet)	Depth (feet)
Topsoil	1	1
Clay, sandy	3	4
Sand, clayey	12	16
Sand and gravel	23	39
Sand, clayey, brown	6	45
Sand and gravel	2	47
Gravel, very clayey	7	54
Sand, very clayey	3	57
Clay, slightly sandy	8	65

150-72-28bad
Harvey test hole 60-4
(Log by C. A. Simpson & Sons)

Altitude: 1,525 feet

Formation	Material	Thickness (feet)	Depth (feet)
	Topsoil	1	1
	Clay, sandy, brown	3	4
	Sand, clayey, gray	10	14
	Sand, gravel, pebbles, somewhat clayey	2	16
	Sand and gravel	22	38
	Sand, very clayey	4	42
	Sand and gravel	1	43
	Sand, coarse, gravelly	1	44
	Sand with coal	4	48
	Sand, coarse, gravel	6	54
	Sand	2	56
	Sand, coarse, gravel	16	72
	Gravel, hard packed	2	74

150-72-28bdb
Harvey test hole 60-2
(Log by C. A. Simpson & Sons)

Altitude: 1,525 feet

Topsoil	1	1
Clay, sandy, brown	4	5
Sand, slightly clayey, gray	23	28
Sand and gravel, clayey, heaves	17	45

150-72-31
Conrad Kafton
(Log by Russell Drilling Co.)

Altitude: 1,600 feet

Sand, silty	14	14
Gravel, sandy	41	55
Clay, blue	105	160
Clay, blue, streaked with gravel	25	185
Sand	5	190
Clay, blue	5	195

150-73-2bba
Test hole 17
(Log by U.S. Bureau of Reclamation)

Altitude: 1,610 feet

Topsoil	1.8	1.8
Sand, fine sand, with zones of silty fine sand, tan	23.2	25
Clay (till), silty to very sandy, brown	4.5	29.5
Sand, medium and coarse, 10 percent gravel, brown	.5	30

150-73-9aaa
Test hole 2491

Altitude: 1,615 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Sand, very silty and clayey, dusky-yellow	4	4
	Gravel, fine, sandy, rusty-brown, poorly sorted, angular to subrounded	12	16
	Gravel, silty and sandy, unoxidized	6	22
	Till, silty, olive-gray, occasional rock	111	133
	Clay, olive-gray, smooth, calcareous	8	141
	Silt, sandy, light-olive-gray	17	158
	Sand, fine, gray, well-sorted, subrounded	3	161
	Silt and fine sandy clay, light-olive-gray to olive-gray, soft	32	193
	Till, sandy, olive-gray	59	252
	Till, gravelly	12	264
	Till, very silty, light-olive-gray, soft, calcareous	41	305
Pierre Formation:			
	Shale, olive-black, noncalcareous	42	347

150-73-13ddd
Test hole 2499

Altitude: 1,600 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, silty, black	1	1
	Clay, very silty, light-olive-gray	1	2
	Till, sandy, dusky-yellow	3	5
	Sand, medium to fine grained, oxidized	7	12
	Till, olive-gray	8	20
Pierre Formation:			
	Shale, dark-olive-gray	33	53

150-73-15ccc
Test hole 2544

Altitude: 1,605 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, sandy, dusky-brown	1	1
	Sand, gravelly, dusky-yellow, subangular to subrounded	4	5
	Till, silty, light-olive-gray	2	7
	Clay, olive-gray, calcareous	2	9
	Till, very silty, olive-gray	9	18
	Sand, poorly sorted, subangular to subrounded	1	19
	Till, silty to sandy, olive-gray, rocky	147	166
Fox Hills Formation:			
	Sand, fine to very fine, greenish-gray, angular to subangular, noncalcareous	23	189

150-73-19ddd
Test hole 2666

Altitude: 1,607 feet

Formation	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Topsoil, black	1	1
	Till, silty to sandy, moderate-yellowish-brown	8	9
	Sand, very fine to fine, silty	6	15
	Gravel, fine to medium, sandy	3	18
	Till, very silty, olive-gray	102	120

150-73-26aba
Leonard Smestad
(Log by A. B. Kamoni)

Altitude: 1,605 feet

Topsoil, black	2	2
Clay, yellow	4	6
Sand, yellow	8	14
Sand, yellowish-gray	4	18
Clay, rocky	2	20

TABLE 5.--Chemical analyses of selected water samples

EXPLANATION

Analytical results are in parts per million, except where indicated.

Use of water

C, commercial; H, domestic; P, public supply; S, stock; U, unused.

TABLE 5 CHEMICAL ANALYSES OF SELECTED WATER SAMPLES

LOCATION NUMBER	USE OF WATER	WELL DEPTH (FEET)	DATE OF COLLECTION	SILICA (SIO2)	IRON (FE)	CALCIUM (CA)	MAGNESIUM (MG)	SODIUM (NA)	POTASSIUM (K)	BICARBONATE (HCO3)	CARBONATE (CO3)	SULFATE (SO4)	CHLORIDE (CL)	FLUORIDE (F)	NITRATE (NO3)	BORON (B)	DISSOLVED SOLIDS: RESIDUE AT 180 C	DISSOLVED SOLIDS: CALCULATED	HARDNESS AS CACO3: CALCIUM, MAGNESIUM	HARDNESS AS CACO3: NONCARBONATE	SODIUM ADSORPTION RATIO	SPECIFIC CONDUCTANCE (MICROMHOS AT 25 C)	PH	TEMPERATURE (F)
145N 68W10BCC	U	27	10 12 65	25	.16	80	32	188	7.2	459	0	322	15	.2	3.0	.25	908	899	330	0	4.5	1310	7.8	45
145N 68W12ADD	U	26	10 12 65	28	1.1	73	28	74	6.6	363	0	156	8.8	.2	.0	.14	557	555	299	1	1.9	833	7.9	46
145N 69W26BBB	U	270	10 11 65	27	1.6	166	84	121	11	442	0	650	15	.2	.5	.35	1410	1290	760	398	1.9	1740	7.4	44
145N 70W 2ABA	H	141	8 3 65	17	1.0	98	22	352	10	671	0	505	27	.1	2.7	.93	1330	1370	334	0	8.4	1950	8.4	53
145N 70W 3ADD	H	185	8 3 65	17	.40	24	5.8	812	5.9	890	0	60	762	.2	2.2	3.6	2010	2130	84	0	38	3550	7.9	47
145N 70W 8DCC	H	28	7 30 65	17	1.0	85	23	29	4.1	342	0	75	6.7	.2	2.4	. 0	379	411	305	25	.7	675	7.7	43
145N 70W15DCD	H	100	8 3 65	19	.54	99	26	98	8.0	553	0	113	4.5	.2	.7	.45	599	641	355	0	2.3	1010	7.5	44
145N 70W16BBB	H	445	7 30 65	22	.18	16	5.1	600	6.5	856	0	129	365	.5	2.6	3.4	1540	1570	61	0	33	2560	8.1	47
145N 71W21CCA	H	22	7 28 65	11	.08	440	341	551	14	542	0	3000	90	.0	75	.20	5160	4790	2500	2060	4.8	5160	7.7	50
145N 71W27BAA	H	2590	7 28 65	10	.98	4.8	2.7	1240	3.2	968	39	1000	618	6.7	2.6	7.	3310	3410	23	0		5020	8.6	55
145N 72W10AAA	U	338	11 23 65	27	.99	24	50	412	10	742	0	338	141	.3	.3	.48	1400	1370	260	0	11	2150	8.1	45
145N 73W24DDD	U	16	8 16 66	25	.14	272	151	59	6.8	349	0	936	55	.3	113	.35	1900	1790	1300	1020	.7	2250	7.8	43
146N 68W15DCC	H	50	4 14 66	22	.10	90	31	42	7.8	376	0	54	17	.3	89	.00	491	538	352	44	1.0	842	8.0	41
146N 69W13DDB	P	39	7 20 65	25	2.3	102	29	143	17	488	0	254	18	.2	1.3	.00	821	832	372	0	3.2	1260	7.7	47
146N 69W15CDC	H	2120	7 21 65	10	.52	4.0	1.9	1050	3.4	672	37	1150	349	6.7	2.2	6.0	3060	2950	18	0	34	4320	8.7	49
146N 69W17CCB2	H	2160	3 17 66	10	1.2	6.8	3.2	1060	4.0	597	0	1170	435	3.6	8.0	2.6	2990	3000	30	0	84	4590	8.2	
146N 70W11DAC1	P	26	5 3 66	21	.08	84	67	140	6.2	606	0	221	37	.5	2.2	.47	858	878	485	0	2.8	1360	8.1	41
146N 70W13CCC1	U	30	8 11 66	25	.28	124	42	89	7.2	520	0	194	41	.2	.0	.18	793	779	483	57	1.8	1210	8.0	43
146N 70W13CCC1	U	30	8 11 66	25	.10	120	45	99	7.3	520	0	206	47	.2	.0	.17	816	806	485	59	2.0	1240	8.0	
146N 70W13CCC1	U	30	8 12 66	26	.40	122	43	100	7.2	525	0	198	45	.2	.1	.29	821	801	483	53	2.0	1240	8.0	44
146N 70W30BAA	H	400	6 1 66	28	.18	12	4.0	765	7.5	914	0	12	674	.3	1.6	4.0	1890	1960	47	0	15	3300	8.1	49
146N 71W 4AAA	U	50	11 23 65	28	1.1	90	33	58	6.2	374	0	167	5.2	.1	.0	.19	570	573	360	53	1.3	859	7.9	46
146N 71W15BBB	P	2480	7 21 65	11	.10	6.4	1.0	924	2.4	424	10	1230	294	4.1	7.1	2.1	2750	2700	20	0	90	4010	8.3	64
146N 72W12BBD	S	205	8 0 66		.63					690	0	218	95		.0	1.55	1130		370		5.4	1770	7.6	
146N 72W12BCB	H	98	8 0 66		.64							362	3.0				839		425			1220	7.5	
146N 73W 8DCD	H	380	7 19 65	24	4.9	145	33	233	15	818	0	299	27	.3	3.1	.20	1210	1190	496	0	4.5	1700	7.7	46
146N 73W10CBB	U	416	12 7 65	25	3.1	16	2.9	549	11	934	18	227	172	.6	5.3	3.1	1510	1490	52	0	33	2290	8.4	
146N 73W23DDD	C	470	7 20 65	37	.50	25	5.2	610	6.3	972	0	398	147	.3	7.8	1.6	1750	1720	84	0	29	2570	8.2	47
147N 68W10ADD	U	78	11 13 65	31	4.6	84	44	100	11	531	0	153	8.6	.1	.0	.35	687	698	391	0	2.2	1060	8.0	46
147N 68W12CBB	H	80	8 9 66	29	.38	70	27	97	8.1	395	0	166	11	.3	5.6	.27	594	610	285	0	2.5	905	8.1	47
147N 69W 6ABA1	H	90	8 8 66	27	.02	105	28	228	14	491	0	274	137	.2	4.3	.80	1050	1060	378	0	5.1	1650	8.1	
147N 69W13BDB	U	37	7 21 65	24	1.8	626	277	220	18	362	0	2300	336	.8	3.5	.20	4290	3980	2700	2410	18	4220	7.6	46
147N 69W31CAD	H	86	8 8 66	2.8	4.6	43	38	204	11	197	0	525	17	.2	1.5	.55	962	945	263	102	5.5	1410	8.1	45
147N 70W18DAD	H	35	8 15 66	23	.04	201	88	17	7.2	368	0	448	114	.1	35	.00	1230	1110	863	562	.3	1650	7.7	46
147N 72W 3CBB	U	120	6 5 67	27	.08	43	18	320	8.9	674	0	235	60	.7	.0	1.5	1040	1050	180	0	10	1620	8.0	
147N 72W 6BBB	U	87	7 21 66	33	.20	68	32	203	8.9	646	0	198	3.9	.6	1.0	1.0	832	868	303	0	5.1	1300	8.0	
147N 72W32ABD	H	380	7 20 65	26	1.0	106	11	258	16	768	0	202	38	.5	1.8	.84	1040	1040	310	0	6.4	1550	7.8	47
148N 68W10ADA	U	58	10 13 65	29	.21	128	43	49	8.0	393	0	247	7.0	.2	.0	.14	739	704	495	173	1.0	1040	8.0	45
148N 68W32BAA	H	152	8 3 66	28	.09	44	11	526	11	862	0	54	381	.2	2.8	1.7	1480	1480	156	0	18	2480	8.0	50
148N 70W13BAA	C	2360	7 22 65	10	.06	5.2	1.2	982	2.6	466	4	1290	325	4.2	7.1	2.6	2870	2860	18	0	32	4210	8.3	70
148N 71W24DDD	U	92	11 16 66	28	.04	388	71	150	15	317	0	1190	69	.1	.1	.80	2100	2070	1260	1000	1.8	2470	7.5	45
148N 71W29CBB	H	80	4 26 66	23	.09	94	32	516	8.8	683	0	782	58	.4	55	1.6	1880	1910	365	0	12	2760	8.1	44
148N 71W33ADD	S	32	9 20 66	32	26	64	25	415	10	636	0	570	48	.3	5.3	1.7	1490	1510	263	0	11	2170	8.0	45
148N 72W 4BAA	S	13	9 21 66	25	.48	312	100	302	7.6	369	0	1430	18	.4	28	.16	2420	2410	1190	888	3.8	2900	7.8	53
148N 72W 9CCC	U	38	7 18 66	34	.50	123	37	145	10	445	0	395	7.3	.2	.1	.23	939	971	459	95	2.9	1370	7.7	45
148N 72W15ABA	U	97	11 5 65	30	2.0	56	27	157	8.0	462	0	182	16	.3	.5	.47	713	706	252	0	4.2	1060	7.8	45
148N 72W34DAD	U	95	7 20 66	27	3.6	75	20	23	7.5	328	0	59	.9	.3	.5	.23	391	379	271	2	.6	601	8.0	
148N 73W12CCA	C	160	4 26 66	40	.05	4.0	1.5	426	4.0	734	9	285	23	.5	2.0	1.6	1140	1140	16	0	46	1760	8.4	48
148N 73W14ADD	U	21	12 2 65	27	2.4	120	55	363	7.6	572	0	780	31	.3	1.3	.51	1580	1670	526	59	6.9	2250	8.1	45
148N 73W35DAA	U	72	5 18 66	33	1.5	80	44	174	8.2	552	0	265	20	.3	1.0	.39	870	899	381	0	3.9	1350	8.0	45
149N 68W 5DBC	H	17	12 20 66	24	.10	93	32	16	4.5	289	0	111	16	.2	31	.20	468	470	365	128	.4	732	7.7	46
149N 68W21CBC	U	238	10 14 65	25	.92	31	15	430	7.6	1040	0	77	122	.3	.7	.22	1250	1220	139	0	16	1950	7.8	45
149N 69W 5DDD2	U	200	7 31 66	25	2.8	180	82	195	14	657	0	616	25	.4	5.6	.33	1500	1470	786	248	3.0	1960	7.8	47
149N 69W11CCA	U	176	6 1 67	[illegible]	2.1	56	15	364	9.0	1010	0	14	100	.5	.4	.23	1080	1080	200	0	11	1740	7.9	46
149N 69W24BCC	U	277	10 19 65	27	.85	38	16	375	7.3	899	0	63	141	.3	.0	.25	1130	1110	160	0	13	1810	8.1	
149N 70W 2AAA	U	79	10 21 65	27	8.9	207	137	100	13	496	0	810	17	.0	1.1	.43	1660	1570	1080	673	1.3	1990	7.6	45
149N 70W 4DAA1	P	207	7 22 65	20	5.2	119	31	276	12	986	0	188	24	.3	3.5	.25	1130	1170	426	0	5.8	1730	7.8	50
149N 70W 9DAA1	U	197	5 16 66	24	.16	92	43	432	4.5	842	0	351	202	.1	.7	.12	1600	1560	408	0	9.0	2450	8.0	45
149N 71W19CDD	U	158	7 14 66	28	1.4	129	43	150	11	606	0	302	18	.4	.5	.27	947	982	499	3	2.9	1420	7.8	47
149N 71W28DAB	P	28	5 3 66	17	.16	74	90	213	17	680	0	400	39	.4	16	3.2	1190	1200	555	0	3.9	1810	8.1	43
149N 71W31CCB	U	126	6 5 67	24	2.4	174	39	273	15	405	0	764	43	.3	3.0	.94	1590	1540	595	263	4.9	2110	7.3	43
149N 72W 3AAA2	U	48	7 14 66	25	2.7	386	405	449	11	470	0	3150	11	.3	.4	.27	4910	4670	2630	2250	3.8	4730	7.7	47
149N 72W 7AAA	C	2310	7 20 65	10	2.0	6.4	1.5	1170	2.3	635	0	1230	573	2.0	2.2	2.6	3160	3320	22	0		5010	8.1	76
149N 72W 7DDD	S	110	7 15 66	41	.24	2.6	.7	337	2.9	730	0	61	41	1.2	.6	1.7	770	850	10	0	46	1310	8.3	45
149N 72W24DDB	U	110	6 6 67	23	1.7	142	24	159	10	708	0	181	29	.1	.0	.20	887	919	455	0	3.2	1390	7.7	
149N 73W 9BBB2	S	80	4 26 66	28	1.9	90	29	25	7.3	406	0	64	4.0	.2	2.7	.16	410	452	344	11	.6	717	8.2	44
150N 70W17ADA	H	26	11 6 65	26	.31	278	143	115	10	352	0	1080	54	.2	7.3	.11	2100	1890	1280	991	1.4	2360	8.1	
150N 70W20DAD1	P	15	5 4 66	20	1.1	109	44	46	7.6	394	0	198	19	.2	4.0	.23	630	643	453	130	.9	994	8.1	40
150N 70W31CDD	U	318	7 26 66	27	.3	110	33	326	11	568	0	522	80	.6	.7	.55	1360	1390	410	0	7.0	1990	7.8	
150N 71W 4BAA	H	170	7 20 65	21	4.0	78	20	160	8.1	622	0	81	25	.3	1.8	.00	673	706	276	0	4.2	1100	7.8	48
150N 71W 4DDD	U	267	11 9 65	26	1.4	40	28	203	8.8	621	0	114	25	.2	.0	.01	755	751	216	0	6.0	1180	7.7	44
150N 71W26ABB	U	257	10 28 65	27	3.3	114	52	208	11	435	0	552	32	.1	3.0	.15	1260	1220	497	140	4.1	1730	7.8	
150N 71W29AAB	U	99	7 25 66	28	.40	118	38	208	13	655	0	267	76	.4	.2	.74	1050	1070	451	0	4.3	1620	7.7	46
150N 72W28ABB1	P	36	2 16 67	28	1.9	93	26	255	10	751	0	216	37	.3	13	1.2	1060	1050	338	0	6.0	1580	7.9	
150N 72W28ABB2	P	65	7 20 65	25	2.4	109	31	277	11	841	0	240	46	.2	19	.84	1170	1180	400	0	6.0	1750	7.7	
150N 73W 4BBB	H	35	11 4 65	21	2.5	55	30	46	3.7	360	0	47	6.6	.3	14	.21	393	404	262	0	1.2	654	8.1	51