NORTH DAKOTA GEOLOGICAL SURVEY
WILSON M. LAIRD, *State Geologist*

BULLETIN 48

NORTH DAKOTA STATE
WATER CONSERVATION COMMISSION
MILO W. HOISVEEN, *State Engineer*

COUNTY GROUND WATER STUDIES 9

GEOLOGY and GROUND WATER RESOURCES

WILLIAMS COUNTY, NORTH DAKOTA

PART II — GROUND-WATER BASIC DATA

by

C. A. ARMSTRONG

GEOLOGICAL SURVEY
United States Department of the Interior

Prepared by the United States Geological Survey in cooperation with the North Dakota State Water Commission, North Dakota Geological Survey, and Williams County Board of Commissioners.

GRAND FORKS, NORTH DAKOTA

1967

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

CONTENTS

ILLUSTRATIONS

TABLES

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

By

C. A. Armstrong

INTRODUCTION

Purpose and Scope

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

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

The information in this report was collected between 1963 and 1966 and consists of the following: (1) data on about 1,400 wells, springs, and test holes; (2) water-level measurements in 42 observation wells; (3) chemical analyses of 140 water samples; and (4) logs of 223 test holes and selected wells.

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

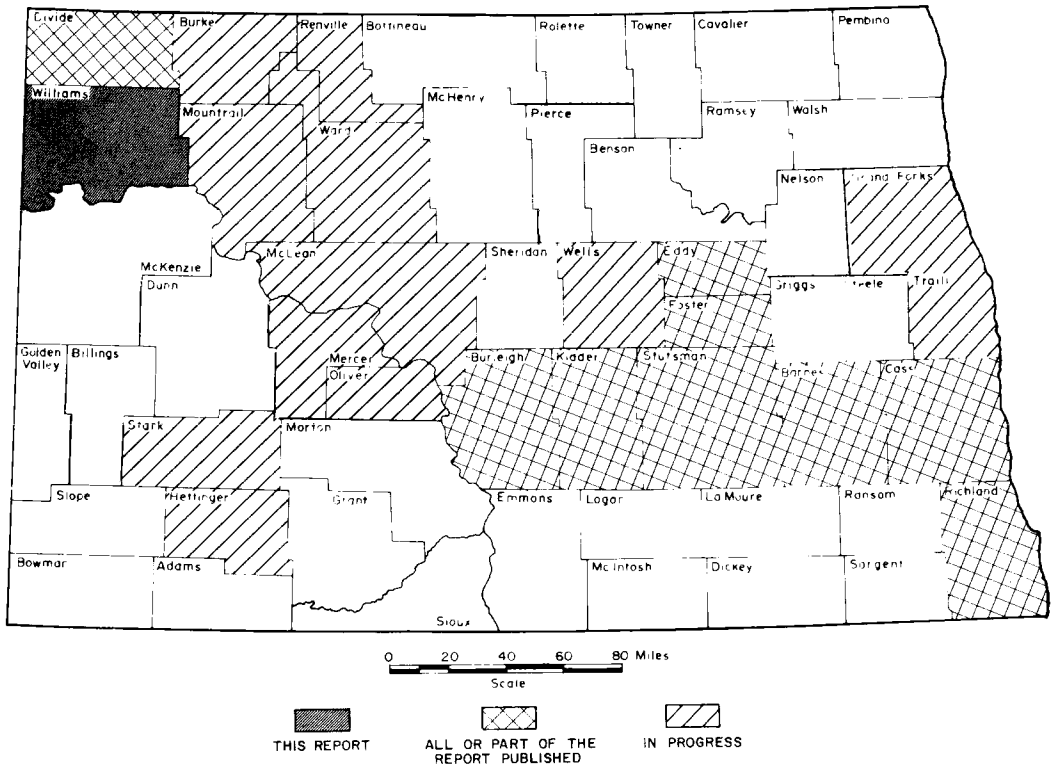

Figure 1.--Map showing location of county ground-water studies.

Well-Numbering System

The wells, springs, and test holes in the tables are numbered according to a system based on the location in the public land classification of the U.S. Bureau of Land Management. It is illustrated in figure 2. The first numeral denotes the township north of a base line, the second numeral denotes the range west of the fifth principal meridian, and the third numeral denotes the section in which the well is located. The letters a, b, c, and d designate, respectively, the northeast, northwest, southwest, and southeast quarter sections, quarter-quarter sections, and quarter-quarter-quarter sections (10-acre tract). For example, well 157-95-15add is in the SE¼SE¼NE¼ sec. 15, T. 157 N., R. 95 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 figure 3 (in pocket).

Acknowledgments

Thanks are due to the County Commissioners, township assessors, and many other people of Williams County for their cooperation in the collection of these data. The geologic logs were compiled principally by L. L. Froelich and Alain Kahil of the North Dakota State Water Commission. The author is especially grateful to the U.S. Corps of Engineers, U.S. Bureau of Reclamation, Signal Gas and Oil Co., Amerada Oil Co., and E. H. Prather and other water well drillers who supplied logs and information for this report.

EXPLANATION OF TABLES

The test holes that were drilled as part of this investigation are identified in the tables by location number only. Test holes 1-776 to 35-776 were drilled by the North Dakota State Water Commission as part of a special study in the Little Muddy valley area (Schmid, 1961). Test holes 726 to 786 were drilled as part of a cooperative study by the U.S. Geological Survey and the North Dakota State Water Commission in the Tioga and Hofflund Flats areas (Paulson and Powell, 1962). Other numbered test holes were drilled as part of miscellaneous cooperative studies. The location of each test hole is shown on figure 3.

The logs of test holes drilled as part of this investigation are a composite from the geologic logs, drillers' logs, sample analysis logs, and electric logs (where available). Logs of commercial test holes and wells were furnished by the company or agency shown in the heading of the log and the terminology used is that of the individual driller with the exception that the order has been changed to present the principal lithology first.

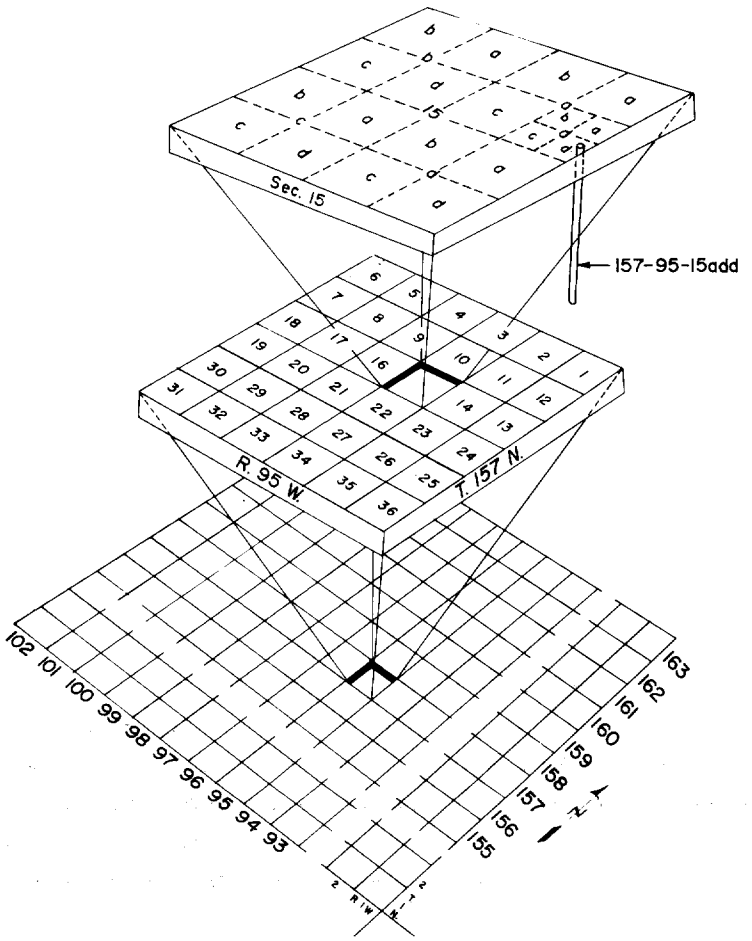

Figure 2.--System of numbering wells, springs, and test holes.

The logs of wells noted in table 1 but not given in table 3 may be obtained from the U.S. Geological Survey, Bismarck, North Dakota, or from the North Dakota State Water Commission, Bismarck, North Dakota.

Sample description logs for all the test holes drilled as part of this investigation were prepared at each test-hole site. Visual examination, while the samples were still wet and fresh, was made with a binocular microscope. Color descriptions were determined by comparing the sample with the color charts of Goddard (1948). If the cuttings reacted (effervesced) when treated with diluted hydrochloric acid, the material was described as calcareous. Grain-size determinations used in the logs refer to the Wentworth (1922) size scale. Plastic is a term generally applied to clay and indicates that the material may be molded into any form without fracturing. Cohesion is used to indicate the capacity of the material to stick together. Because most clays and silts are cohesive to some degree, the term was used only to differentiate cohesive silt from non-cohesive silt.

The term "till" indicates an unsorted, unstratified, cohesive, agglomeration of rock particles ranging from clay to boulders. In Williams County all the till encountered was calcareous. Generally clay is the dominant particle size. If a particle size other than clay is present in an appreciable amount, 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 till contains an appreciable, but not a dominant amount of the modifying material.

Observation wells were developed in selected test holes. These consist for the most part of 1¼-inch plastic pipe slotted in the lower 10 or 20 feet, or screened in the lower 3 feet. Most of these wells were pumped for a few hours and a water sample was collected for chemical analysis (table 4). Most of the water-level measurements listed in table 3 were made during this investigation. However, measurements made before 1962 in wells 153-102-13bbb and 16ddd were made by the U.S. Corps of Engineers (written communication).

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 generally is 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, hardness, pH, and specific conductance. The source and significance of the different constituents and properties of natural waters are discussed in the following paragraphs.

Laboratory calculations were rounded to no more than three significant figures for use in table 4.

Mineral Constituents in Solution

Silica (SiO_2)

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

Iron (Fe)

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

Calcium (Ca)

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

Magnesium (Mg)

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

Sodium and potassium (Na and K)

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

Bicarbonate and carbonate (HCO and CO_3)

Bicarbonate and carbonate commonly are reported as alkalinity. Since the major causes of alkalinity in most natural waters are carbonate and bicarbonate ions dissolved from carbonate rocks, the results usually are reported in terms of these constituents. Although alkalinity primarily is 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 usually is dependent upon the nature of the cations (Ca, Mg, Na, K) associated with it. However, moderate amounts of alkalinity do not adversely affect most use.

Sulfate (SO_4)

Sulfate is dissolved from many rocks and soils--in especially large quantities from gypsum and from beds of shale. It is formed also by the oxidation of sulfides of iron and therefore may be present in considerable quantities in mine waters. The concentration of sulfate in waters generally is 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 generally are very soluble compounds and are found in most rocks so that chlorides are found in all natural waters. Large quantities of chloride may affect the industrial use of water by increasing the corrosiveness of waters that contain large quantities of calcium and magnesium. The U.S. Public Health Service (1962) recommends an upper limit of 250 ppm of chloride for drinking water.

Fluoride (F)

Fluoride has been reported as being present in igneous and some sedimentary rocks to about the same extent as chloride. However, most fluorides, unlike the chlorides, are low in solubility so that the quantity of fluoride in natural waters is ordinarily very small compared to that of chloride. Hem (1959) reported that fluoride concentrations in excess of 10 ppm are rare. Investigations have proved that fluoride concentrations of about 0.6 to 1.7 ppm reduced the incidence of dental caries and that concentrations greater than 1.7 ppm also protect the teeth from cavities but cause an undesirable black stain (Durfor and Becker, 1964). U.S. Public Health Service (1962, p. 8) states, "When fluoride is naturally present in drinking water, the concentration should not average more than the appropriate upper control limit (0.6 to 1.7 ppm). Presence of fluoride in average concentrations greater than two times the optimum values shall constitute grounds for rejection of the supply." Concentration higher than the stated limits may cause mottled enamel in teeth, endemic cumulative fluorosis, and skeletal effects.

Nitrate (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 because ingestion of water containing more than this 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 usually are satisfactory for domestic and some industrial uses. Water containing several thousand parts per million of dissolved solids sometimes are successfully used for irrigation where practices permit the removal of soluble salts through the application of large volumes of water on well-drained lands, but generally water containing more than about 2,000 ppm is considered to be unsuitable for long-term irrigation under average conditions.

Properties and Characteristics of Water

Temperature

Temperature is an important factor in properly determining the quality of water. This is very evident for such a direct use as an industrial coolant. Temperature is also important, but perhaps not so evident, for its indirect influence upon concentrations of dissolved gases and distribution of chemical solutes in ground water. Normally, the temperature of ground water within 60 feet of the surface approximates the mean annual air temperature and increases 1° F for each 60 to 100 feet increase with depth.

Hardness

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

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

Generally, bicarbonate and carbonate determine the proportions of "carbonate" hardness of water. Carbonate hardness is the amount of hardness chemically equivalent to the amount of bicarbonate and carbonate in solution. Carbonate hardness is equal approximately 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. In this report hardness of water is classified as follows:

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 about 200 ppm generally requires softening treatment (Durfor and Becker, 1964).

Sodium-adsorption ratio (SAR)

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

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

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

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

Specific conductance (micromhos per centimeter at 25° C)

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

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

Hydrogen-ion concentration (pH)

Hydrogen-ion concentration is expressed in terms of pH units. The values of pH are often 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 determing 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 water ranges between 5.5 and slightly more than 8.

SELECTED REFERENCES

Durfor, C. N., and Becker, Edith, 1964, Public water supplies of the 100 largest cities in the United States, 1962: U.S. Geol. Survey Water-Supply Paper 1812.

Goddard, E. N., and others, 1948, Rock color chart: Washington National Research Council.

Hem, J. D., 1959, Study and interpretation of the chemical characteristics of natural water: U.S. Geol. Survey Water-Supply Paper 1473.

Paulson, Q. F., and Powell, J. E., 1962, Geology and ground water resources of Tioga and Hofflund Flats areas, Williams and Mountrail Counties, N. Dak. State Water Comm. Ground Water Studies, no. 43.

Schmid, R. W., 1961, Report on ground water availability for irrigation purposes in the Little Muddy Valley area, Williams County, N. Dak.: N. Dak. State Water Comm. Ground Water Studies, no. 36.

U.S. Public Health Service, 1962, Drinking water standards, 1962, U.S. Public Health Service Pub. 956.

U.S. Salinity Laboratory Staff, 1954, Diagnosis and improvement of saline and alkali soils: U.S. Dept. of Agriculture, Agriculture Handbook 60.

Wentworth, C. K., 1922, A scale of grade and class terms for clastic sediments: Jour. of Geol., v. 30, p. 377-392.

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

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

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

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

Use of water: D, domestic; Ind, industrial; Irr, irrigation; N, not used; O, observation; OT, oil test; PM, pressure maintenance; Ps, public supply; S, stock; T, test hole.

Aquifer: Cl, clay; Gv, gravel; Lg, lignite; Lm, limestone; Sd, sand; Sdy, sandy; St, silt; Ss, sandstone.

Lift and power: Bu, bucket; Cn, centrifugal; Cy, cylinder; J, jet; P, piston; Sb, submersible; Tu, turbine; E, electric; G, gasoline or diesel; H, hand; W, wind.

Remarks: C, chemical analysis is shown in table 4; F, flows; gpm, gallons per minute; L, log is shown in table 2; LM, additional data are shown in Schmid, R. W. (1961); Lpc, well yields less than pump capacity; Np, water reported to be unfit for human consumption; T 47°, temperature in degrees fahrenheit; Td 200, total depth drilled in feet; TS, additional data are shown in Paulson and Powell, (1962); Wa, water reported to be alkaline; Wh, water reported to be hard; Wl, water level is shown in table 3, Ws, water reported to be soft; Y, yields.

Location number	Owner or name	Depth of well (feet)	Diameter or size (inches)	Type	Date Completed	Depth to water below land surface (feet)	Date of measurement	Use of water	Aquifer	Lift and power	Specific conductance	Elevation of land surface	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
152-100													
3bbb	Selmer Kjorstad	750	4	Dr	1917	F	1965	D,S	...	....	3,050	.....	F 3 gpm, T 59°, Ws, C.
4bcb	J. H. Kjorstad	34	.....	Dr	.....	.....	.....	S	Sd	Cy,E	.....	.....	Wh.
152-103													
1dda1	Robert Bearce	80	5	Dr	1962	30	1964	D	Sd,Gv	J,E	.....	.....	Wh.
1dda2	..do...	34.5	1.25	Dv	1952	14.13	7-10-64	N	Sd	....	.....	.....	Wh.
5bbb	Test hole	147	4.75	Dr	5-65	.....	.....	T	...	....	.....	1,936	L.
5bcc	M. W. Anderson	86	5	Dr	1961	50	1964	D,S	Gv	Sb,E	.....	.....	Wh (340 ppm).
7ddd	Test hole	153	1.25	Dr	6-65	4.09	7-15-65	O	Gv	N	1,420	1,871	Td 200 ft, L, Wl, C.
8bbb	Test hole	137	1.25	Dr	5-65	37.80	6-9-65	O	Gv	N	2,150	1,901	Td 220 ft, L, Wl, C.
8bcb	Floyd Ryder	65	2	Dv	.....	.....	.....	S	Sd	Cy,E	.....	.....	Wh.
9ddd	J. D. Gannaway	40	5	Dr	1964	27	1964	S	Gv	J,G	.....	.....	Wh.
16ccd	Warren Gathman	30	2	Dv	.....	.....	.....	D,S	Sd	J,E	.....	.....	Wh, T 50°.
18bcb	Emery Baxter	18	2	Dv	.....	12	1964	D	Sd	Cy,H	.....	.....	Wh.
19ccb1	J. D. Gannaway	20	2	Dv	1944	14	1964	D	Sd	E	.....	.....	Wh.
19ccb2	..do...	27	2	Dv	1954	18	1964	S	Sd	E	.....	.....	Wh.
19ccb3	..do...	70	5	Dr	1964	.....	.....	S	Gv	Sb,E	.....	.....	Wh.
20aaa	Warren Gathman	18	2	Dv	.....	13	1964	S	Sd	Cy,E	.....	.....	Wh (718 ppm).
30bba	Floyd Ryder	18	2	Dv	1947	10	1964	D	Sd	E	.....	.....	Wh.
152-104													
1cca	Alberta Dodd	125	2.5	Dr	1900	110	1964	S	Lg	Cy,G	.....	.....	Ws.
1dda	..do...	100	4	Dr	1942	79	1964	D,S	Lg,Sd	Cy,G	.....	.....	Wh, Np.
1ddd	Test hole	76	1.25	Dr	5-65	68.42	6-9-65	O	Sd,Gv	....	5,760	1,940	Td 116 ft, L, Wl, C.
3cda1	H. E. Zimmerman	100	4	Dr	.....	9	1964	S	Sd	Cy,E	.....	.....	Wh, Np, Lpc.
3cda2	..do...	146	.....	Dr	1963	111	1964	S	Cl	Sb,E	.....	.....	Wh, Wa, Np.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
152-10$, Cont.													
6dd	B. T. Nordell	125	.....	Dr	.....	.....	.....	S	...	Cy,E	.....	.....	Y 8 gpm.
6ddd	..do...	218	4	Dr	1962	50	1965	S	...	Cy,E	.....	.....	
8bca	..do...	100	4	Dr	.....	50	1965	D	Gv	Cy,E	.....	.....	C.
8bcd	..do...	84	4	Dr	1965	60	1965	D	Sd	Sb,E	.....	.....	Y 5 gpm.
8dca	O. M. Seel	34	2	Dv	1952	.....	.....	D	Gv	E	.....	.....	
9acd	Paul Martin	75	.....	Dr	1930	.....	.....	S	...	Cy,E	.....	.....	Ws, Np, Lpc.
9dda	H. E. Zimmerman	100	.....	Dr	1950	75	1965	S	Sd	Cy,E	.....	.....	Wh.
10cbb	Village of Buford	1,200	4	Dr	1915	F	1965	S	...	....	.....	.....	Ws.
10cbd	Paul Martin	209	.....	Dr	1944	99	1964	S	Lg	Cy	.....	.....	
11aad	Lee McNary	105	.....	Dr	1945	.....	.....	S	Lg	....	.....	.....	Wa, Np.
11add	Test hole	110	1.25	Dr	6-65	63.73	7-15-65	O	...	....	4,950	1,938	Td 136 ft, L, Wl, C.
13add	Emery Baxter	28	2	Dv	.....	.....	.....	S	Sd	Cy,E	.....	.....	Wh.
13dad1	J. D. Gannaway	20	2	Dv	1944	10	1964	D	Sd	J,E	.....	.....	
13dad2	..do...	28	2	Dv	.....	15	1964	S	Sd	Cy,E	.....	.....	Wh.
14aaa	Glenn Houston	32	4	Dr	1955	16	1964	D	Gv	J,E	.....	.....	Wh (340 ppm).
14bbb	Test hole	116	4.75	Dr	6-65	.....	.....	T	...	....	.....	1,889	L.
14bbc	Nellie Seel	60	4	Dr	1961	20	1964	D,S	Gv	J,E	.....	.....	Wh.
15aac	Delbert Dishon	40	4	Dr	1960	37	1964	D,S	Gv	J,E	.....	.....	Wh.
16bdd	State Historical Society	150	4	Dr	1962	.....	.....	D	Sd	Sb,E	.....	.....	Wh (580 ppm).
24aba	Roger Dahl	17	2	Dv	1955	.....	.....	D	Sd	J,E	.....	.....	Wh.
153-98													
3bab	Jay Thomas	Spring	.....	..	.....	F	1964	S	Lg	....	.....	.....	F 3.5 gpm.
3bba	..do...	Spring	.....	..	.....	F	1964	S	Lg	....	.....	.....	F 3.5 gpm.
3dca	..do...	Spring	.....	..	.....	F	1964	S	Lg	....	.....	.....	F 2 gpm.
7cba	N. O. Ellingsberg	Spring	.....	..	.....	F	1964	S	Gv	....	.....	.....	F 5 gpm, T 47°.
7cbb1	..do...	Spring	.....	..	.....	F	1964	S	Lg	....	.....	.....	F 2 gpm.
7cbb2	..do...	12	36-24	Du	1950	10	1964	D	Gv	T,E	.....	.....	Wh.
8ad	George King	Spring	.....	..	.....	F	1964	D,S	Lg	....	.....	.....	F 2 gpm.
8dda1	..do...	30	24	B	1948	26	1964	D,S	Lg	Cy,E	.....	.....	Wh, Lpc.
9bcd	Joe Scanlon	30	48	Du	1943	26	1964	D,S	Lg	J,E	.....	.....	Wh.
10bdb	Jay Thomas	323	4-3	Dr	1946	117	1964	D,S	Sd	Sb,E	.....	.....	Ws, Wa.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
153-98, Cont.													
18bbb	Ingar Braaten	Spring	.....	..	.....	F	1964	S	...	....	.....	.....	Wh, F 4 gpm, T 45°.
18bbc	..do...	Spring	.....	..	.....	F	1964	S	...	....	.....	.....	F 4 gpm.
18dad	George Bingeman	10	12	Du	1916	7	1964	D	Cl,Gv	Cy,H	.....	.....	Wh, Lpc.
18dac1	..do...	21	36	Du	1936	18	1964	S	Lg	Cy,H	.....	.....	Wh, Wa, Lpc.
18dac2	..do...	28	24-6	B	1950	18	1964	S	Lg	Cy,E	.....	.....	Wh, Wa.
153-99													
1adb	Iver Wold	40	6	Dr	1954	32	1964	D	Lg	Cy,H	.....	.....	Wh.
2dbc1	Victor Nelson	35	24	B	1949	18	1964	S	Sd	Cy,E	.....	.....	Wh (273 ppm).
2dbc2	..do...	46	12	..	.....	21	1964	D	Sd	J,E	.....	.....	Wh (273 ppm).
3abb1	Gust Nelson	48	24	B	1917	36	1964	S	Sd	Cy,G	.....	.....	Wh, Wa, Lpc.
3abb2	..do...	285	6	Dr	1953	50	1964	S	...	Cy,H	.....	.....	Wh, Wa, Np, Lpc.
5dcc	S. & N. C. Brogger	16	24	Du	1914	10	1964	D,S	Lg	Cy,E	.....	.....	Wh.
8bcb	Ingman Holm	60	24	Du	.....	55	1964	D	...	E	.....	.....	Ws, Lpc.
8bcd	..do...	Spring	.....	..	.....	F	1964	S	...	....	.....	.....	Ws, F 3 gpm.
8cbb	Cora Langseth	12	30	Du	1948	8	1964	S	Gv	Cy,E	.....	.....	Wh, Lpc.
11ddd	Gary Nelson	Spring	.....	..	.....	F	1964	S	...	....	.....	.....	F 3 gpm, T 45°.
13aaa	Ingar Braaten	16	24	Du	1950	8	1964	D	Gv	E	.....	.....	Wh.
13ca	..do...	Spring	.....	..	.....	F	1964	S	Lg	....	.....	.....	Wh, F 3 gpm.
14bbb	John Abramson	Spring	.....	..	.....	F	1964	D,S	...	....	.....	.....	F 5 gpm.
17abc	Bergethe Langseth	60	24	B	.....	10.45	6-10-64	N	...	....	.....	.....	
17abd	..do...	.....	24	B	.....	5.59	6-10-64	S	...	....	.....	.....	
19aab	Rudolph Hexon	38	24	B	1938	20	1964	D,S	Sd	Cy,H	.....	.....	Wh.
20bad	..do...	Spring	.....	..	.....	F	1964	S	Lg	....	.....	.....	F 1.5 gpm.
28cad	Seymour Foster	500	2	Dr	1911	F	1964	D,S	...	....	.....	.....	Ws, F 5 gpm, T 60°.
30daa	Rudolph Hexon	900	4	Dr	1916	F	1964	S	...	....	.....	.....	Ws, F 1 gpm.
153-100													
1baa	G. O. Skurdal	52	24	B	.....	46	1964	S	Lg	J,E	.....	.....	Wa.
2aa	..do...	Spring	.....	..	.....	F	1964	S	Lg	....	.....	.....	F 3 gpm, T 53°.
2bac1	Ekof Stokke	28	48	Du	1914	20	1964	D,S	Lg,Gv	Cy,H	.....	.....	
2bac2	..do...	612	4-2	Dr	1946	360	1964	N	Sd	Cy,W	.....	.....	Ws.
12bdd	Thomas Stangeland	73	24	B	1924	50	1964	D,S	Gv	J,Cy,E	.....	.....	Wh.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
153-100, Cont.													
21aab	Ray Lynch	36	.....	Du	.....	30	1964	D,S	Sd	Cy,G	.....	.....	Wh, Lpc.
21aac	John Solem	40	1.25	Dv	.....	30	1964	S	Sd	Cy,E	.....	.....	Wh.
21dba	Ekof Stokke	36	1.25	Dv	.....	30	1964	S	Sd	Cy,E	.....	.....	Wh.
23bba	John Kjorstad, Jr.	612	4	Dr	1946	.....	.....	N	Sd	Cy,W	.....	.....	Ws.
23cdd	Arthur Seidel	412	4	Dr	1962	.....	.....	D,S	Sd	Cy,E	.....	.....	Np.
24bbb	John Kjorstad, Jr.	100	24	Dr	1947	.....	.....	S	Lg	Cy,E	.....	.....	Lpc.
26bac1	Lewis Kjorstad	30	36	Du	1948	27	1964	D	Gv	J,E	.....	.....	Wh, Lpc.
26bac2	..do...	150	4	Dr	1956	.....	.....	S	Lg	Cy,E	.....	.....	Ws.
27cca	Wm. Penman	165	4	Dr	1958	100	1964	D	Sd	J,E	.....	.....	
153-102													
2cbb1	Robert Hansen	70	24	B	.....	60	1964	D	Lg	Cy,E	.....	.....	Wh, Lpc.
2cbb2	..do...	203	4	Dr	1956	143	1964	D	Lg	Cy,E	.....	.....	Ws.
3daa	E. W. Hansen	82	5	Dr	1915	64	1964	D,S	Cl	Cy,E	.....	.....	
3dab	..do...	22	36	Du	1950	18	1964	S	Cl	Cy,E	.....	.....	
6ccb	Robert Bearce	40	5	Dr	1962	15	1964	N	Sd	Cy	.....	.....	Wh.
9dcc	H. A. Martin	108	.....	Dr	1956	48	1964	D,S	Sd	J,E	.....	.....	Ws.
9ddd	F. T. Martin	46	48	Du	1934	35	1964	D,S	Lg	J,E	.....	.....	Ws.
10ccd1	Tom Martin	40	4	Dr	1959	32	1964	D	Gv	J,E	.....	.....	Ws.
10ccd2	..do...	126	4	Dr	1961	75	1964	N	Cl	Cy,H	.....	.....	
10dad	Charles Patch	200	4	Dr	.....	60	1964	D,S	..	J,E	.....	.....	Ws.
11bd	..do...	Spring	.....	..	.....	F	1964	S	..	....	.....	.....	F 2 gpm.
13ddd	U.S. Corps of Engineers 3-1	19	1.5	Dr	.....	10.42	10-20-64	O	..	N	.....	1,853	Wl.
16ddd	U.S. Corps of Engineers 3-3	21	15	Dr	.....	10.21	4-14-64	O	..	N	.....	1,856	Wl.
17adc	Albert Falcon	64.6	18	B	1963	59.14	7-9-64	N	Gv	....	.....	.....	
17cca1	B. W. Rossmiller	30	.....	Du	1938	24	1965	D	..	Cy,E	.....	.....	C.
17cca2	Test hole	52	4.75	Dr	5-65	.....	.....	T	..	....	.....	1,910	L.
17ccb	R. L. Wilkinson	197	4-3	Dr	1944	53	1958	D	Lg	Cy,E	.....	.....	Ws.
17ccc	Test hole	75	1.25	Dr	1965	48.33	5-19-65	O	Gv	N	3,670	1,900	Td 94 ft, L, Wl, C.
17cdb	Trenton School	328	8	Dr	1963	30	1963	Ps	Lg,Sd	Sb,E	2,670	.....	Ws, T 45°, C.
17cdd	J. F. Martin	62	4	Dr	1963	30	1964	S	..	Cy,E	.....	.....	

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
153-102, Cont.													
17dcc	J. F. Martin	68	4	Dr	1963	.....	.....	S	Sd	Cy	2,125	.....	C.
17ddc1	Test hole	94	4.75	Dr	4-66	.....	.....	T	Gv	N	.....	1,860	L.
17ddc2	Test hole	30	1.25	Dr	4-66	9.90	6-21-66	O	Gv	N	2,740	1,860	L, C.
20aab	J. F. Martin	42.0	6	Dr	1939	12.70	10-21-65	N	..	Cy	3,500	.....	C.
31dca1	J. E. Osterlund	26	1.25	Dv	1947	.....	.....	S	Sd	Cy,E	.....	.....	
31dca2	..do...	32	1.25	Dv	1900	.....	.....	D	Sd	Cy,E	.....	.....	
32bbb	Lester Larson	30	1.25	Dv	1964	10	1964	D	Sd	J,E	.....	.....	Wh.
32daa	Raymond Hoffman	40	5	Dr	.....	20	1964	D	Gv	J,E	.....	.....	Wh.
153-103													
6cbb	Test hole	63	4.75	Dr	6-65	.....	.....	T	..	....	.....	2,240	L.
8acc1	Joseph Taylor	190	6	Dr	.....	103	1964	S	Sd	Cy,E	.....	.....	Wh.
8acc2	..do...	120	4	Dr	.....	87	1964	D,S	Lg,Sd	Cy,E	.....	.....	Wh.
8ad	..do...	Spring	.....	..	.....	F	1964	S	Lg	....	.....	.....	Y 10 gpm.
14bcb	H. W. Stiehl	25	30	Du	.....	22	1964	D,S	Lg	J,E	.....	.....	Lpc.
14bcc	John Irwin	38	36	Du	1937	22	1964	D,S	Lg	Cy,E	.....	.....	Wh (425 ppm), T 46°.
14cbb	..do...	75	4	Dr	1958	25	1964	S	Sd,Gv	Cy,E	.....	.....	Wh.
15add	Eugene Hexon	207	4	Dr	1947	171	1964	D,S	Sd	Cy,E	.....	.....	Ws.
16bd	School land	Spring	.....	..	.....	F	1964	S	Lg	....	.....	.....	F 3 gpm.
21aaa	William Moran	160	4	Dr	.....	.....	.....	D,S	Lg	Cy,E	.....	.....	Ws, Np.
23bca	Lloyd Hammer	51	4	Dr	1962	.....	.....	S	Lg	Cy	.....	.....	
24bdb	Wesley Comstock	28	48	Du	.....	18	1964	D,S	Lg	Cy,E	.....	.....	Wh.
24cb	Lloyd Hammer	30	72	Du	.....	24	1964	N	Cl	....	.....	.....	Ws.
24cca	..do...	78	4	Dr	1961	48	1964	D,S	Sd,Lg	Cy,G	.....	.....	Wa, T 47°.
25dad	Test hole	73	1.25	Dr	5-65	42.70	5-19-65	O	Gv	N	.....	1,895	Td 116 ft, L, Wl.
27aaa	John Irwin	Spring	.....	..	.....	F	1964	S	Lg	....	.....	.....	F 1 gpm.
27c	D. C. Scott	Spring	.....	..	.....	F	1964	S	Sd	....	.....	.....	F 10 gpm.
28c	..do...	Spring	.....	..	.....	F	1964	S	..	....	.....	.....	Many seeps.
28d	..do...	Spring	.....	..	.....	F	1964	S	..	....	.....	.....	Many seeps.
29d	..do...	Spring	.....	..	.....	F	1964	S	..	....	.....	.....	F 25 gpm.
33a	..do...	Spring	.....	..	.....	F	1964	S	Lg	....	.....	.....	F 5 gpm.
34aac	..do...	154	4	Dr	1947	92	1964	D,S	..	Cy,E	.....	.....	Ws, T 49°.
35caa	Robert Bearce	100	5	Dr	1900	60	1964	S	..	Cy,E	.....	.....	Ws.
36abd	E. H. Bearce	90	4	Dr	1910	60	1964	D	Gv	J,E	.....	.....	Wh.
36ccd	E. J. Duffey	65	4	Dr	1951	45	1964	D,S	Gv	Sb,E	.....	.....	Ws, T 50°.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
153-104													
1dad	George Willett	125	24	B	1910	110	1964	D,S	..	J,Cy,E	1,840	.....	T 49°, C.
2dda	Gene Iverson	95	4	Dr	.....	73	1964	D,S	..	Cy,E	.....	.....	Wh.
15ac	Eugene Hexon	40	18	B	.....	20	1964	S	Sd	Cy,W	.....	.....	Wh, Lpc.
24bbb	Myrtle Baker	300	4	Dr	1926	270	1964	D,S	..	Cy	.....	.....	Ws.
154-95													
1bbb	R. E. Marmon	106	4	Dr	.....	63	1964	N	Lg	Cy,H	.....	.....	Wh.
4bab	Test hole	130	4.75	Dr	5-66	.....	.....	T	..	.....	.....	1,985	L.
5bab	Chester Halvorson	12	24	Du	1960	11	1964	D	Gv	J,E	.....	.....	Wh.
6add	Haakon Stockman	107	4	Dr	1942	92	1964	D,S	Ss	Cy,E	.....	.....	Ws, Wa.
15ddc	B. L. Lawrence	150	4	Dr	1956	75	1964	D,S	Lg	J,E	.....	.....	Wh.
18c	George Hove	86	.....	Dr	1959	55	1959	....	..	.....	.....	.....	Td 87 ft, L, C.
154-96													
1aaa	Lloyd Hartsoch	34	36	B	1942	21	1964	D,S	Gv	P,E	.....	.....	Wh.
2ab	Amerada Oil Co.	4,655	10.75-7	Dr	1961	200	1961	Pm	Sd	Tu,G	.....	1,894	T 140°.
2acc	Woodrow Sveen	50	4	Dr	1943	20	1964	S	Gv	Cy,E	.....	.....	Wh.
2cdc	Walter Kamp	26	26	B	1963	15	1964	S	Gv	Cy,E	.....	.....	Wh, Lpc.
4abb	H. M. Hove	70	4	Dr	.....	50	1964	D,S	Sd,Lg	Cy,E	.....	.....	
4bba	Test hole 778	50	5	Dr	.....	.....	.....	T	..	.....	.....	1,870	TS.
4ccd1	Annie McLeod	30	.....	..	.....	18	1964	D	Gv	J,E	.....	.....	
4ccd2	..do...	52	4	..	.....	32	1964	S	Gv	Cy,E	.....	.....	
5acc	A. E. Tancre	54	18	B	1913	24	1964	D	Gv	Cy,E	.....	.....	
6aaa	Test hole 1535	157	4.75	Dr	6-59	.....	.....	T	..	.....	.....	1,920	L.
7aaa	Test hole 1537	136	4.75	Dr	6-59	.....	.....	T	..	.....	.....	1,883	L.
8aad	Test hole 777	120	5	Dr	.....	.....	.....	T	..	.....	.....	1,844	TS.
8add	W. T. Crawford	63	3	Dr	.....	10.55	7-28-53	N	Gv	.....	.....	.....	
8bab	Test hole	69	4	Dr	1965	42.45	11-10-65	O	Gv	.....	1,600	1,977	Td 120 ft, L, Wl, C.
8cdc	Test hole 776	90	5	Dr	.....	.....	.....	T	..	.....	.....	1,861	
10cbc	Beaver Creek Luthern Church	67	4	Dr	1958	47	1964	D	Gv	E	.....	.....	
12ccb	Test hole	385	4.75	Dr	5-66	.....	.....	T	..	.....	.....	1,885	L.
17add	J. Hendrickson Est.	115	4	Dr	1957	98	1964	D,S	Lg	Cy,E	.....	.....	Wh.
18bbb	Test hole 1539	84	4.75	Dr	6-59	.....	.....	T	..	.....	.....	1,890	L.
20ccb	Test hole 775	120	5	Dr	.....	.....	.....	T	..	.....	.....	.....	TS.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
154-97													
1aaa	Test hole 1534	136	4.75	Dr	6-59	.....	.....	T	..	.....	.....	1,917	L.
1ddd	Test hole 1538	63	4.75	Dr	6-59	.....	.....	T	..	.....	.....	.....	L.
2aab1	Wayne Vance	185	4	Dr	1955	125	1964	D	Cl	Sb,E	.....	.....	Ws.
2aab2	..do...	100	4	Dr	1963	70	1964	S	Lg	Sb,E	.....	.....	Ws.
2aab3	..do...	175	4	Dr	1941	95	1964	S	Lg	Cy,E	.....	.....	Ws.
4ac	Howard Lund	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	Wh, F 2 gpm.
8dd	..do...	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	1,951	
9daa1	..do...	75	4	Dr	1945	35	1964	D,S	Lg	Sd,J,E	.....	.....	Wh.
9daa2	..do...	126	4	Dr	1952	86	1964	S	Sd	Cy,E	.....	.....	Ws.
10aaa	Test hole 1541	105	4.75	Dr	6-59	.....	.....	T	..	.....	.....	1,951	L.
10ab	John Bakken	220	4	Dr	.....	190	1964	S	Lg	Cy,G	.....	.....	Ws.
11aaa	Test hole 1540	105	4.75	Dr	6-59	.....	.....	T	..	.....	.....	1,903	L.
11bdd	John Bakken	80	4	Dr	.....	10	1964	D	Gv	Cy,W	.....	.....	Wh, Lpc.
12bab	Roy Viall	117	16	Dr	8-66	64.26	8-19-66	Irr	Gv	Tu,G	.....	.....	
12bba	..do...	119	4	Dr	7-66	63.78	8-19-66	O	Gv	N	.....	.....	
12bbb	Test hole	101	1.25	Dr	9-65	63.24	10-4-65	O	Gv	N	1,660	1,903	Td 120 ft, L, Wl, C.
14acb	Howard Lund	130	1.25	Dr	4-66	61.92	5-19-66	O	Gv	N	1,520	1,899	Td 147 ft, L, C.
14acc1	..do...	136	14	Dr	7-66	58.80	7-14-66	Irr	Gv	.....	1,500	1,900	Td 139 ft, C.
14acc2	..do...	130	1.25	Dr	4-66	58.42	7-14-66	O	Gv	N	1,380	1,899	Td 157 ft, L, C.
14acc3	..do...	...	1.25	Dr	4-66	58.23	7-14-66	O	..	N	.....	1,899	Td 136 ft, L.
14bdd	..do...	120	1.25	Dr	4-66	59.79	7-14-66	O	..	N	1,480	1,901	Td 126 ft, L, C.
14dbb	..do...	120	1.25	Dr	4-66	59.87	7-14-66	O	..	N	1,490	1,901	Td 136 ft, L, C.
17bb	..do...	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 1 gpm.
18bdd	Harlen Sawyer	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 3 gpm.
24bbb	Charles Westcott	80	4	Dr	1956	65	1965	D	Gv	Sb,E	1,010	.....	C.
154-98													
8ba	Harris Bingeman	Spring	.....	..	.....	F	1964	S	Ss	.....	.....	.....	Wh, F 3 gpm.
9bba	..do...	199	4	Dr	1915	164	1964	D,S	Lg	Cy,E	.....	.....	Ws.
9da	..do...	Spring	.....	..	.....	F	1964	S	Sd	.....	.....	.....	F 1 gpm.
10ddd1	Thor Hoving	78	4	Dr	1961	37	1964	D	Lg	J,E	.....	.....	Wh, Lpc.
10ddd2	..do...	48	24	B	1935	37	1964	S	Lg	Cy,E	.....	.....	Wh.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
154-98, Cont.													
11ccc1	Thor Hoving	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	Ws, F 2 gpm, T 54°.
11ccc2	..do...	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	Wh, F 2 gpm, T 55°.
11dbb	School well	129.8	4	Dr	1910	122.46	6-24-64	O	..	.....	.....	.....	Wl.
12aa	James Gerling	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	Many small springs.
13dca	Harlen Sawyer	951	4	Dr	1960	380	1964	D,S	Cl	Cy,E	.....	.....	Ws (68 ppm).
16ca	Darwin Krenz	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	F 5 gpm.
17dbb	James Lynch	63	14	B	1957	.....	.....	D,S	Lg	Cy,E	.....	.....	Ws.
19dcd	Anna Shannon	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	Wh, F 4 gpm.
20dd	Keever Est.	Spring	.....	..	.....	F	1964	D,S	Lg	.....	.....	.....	F less than 1 gpm.
22adc	Ruth Parker	80	4	Dr	1957	.....	.....	D,S	..	Sb,E	.....	.....	Wh, Lpc.
23bd	..do...	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 5 gpm.
24aaa	Harlen Sawyer	65	24	B	1948	8	1964	S	Sdy,Cl	.....	.....	.....	Wh, Lpc.
26ac	Ruth Parker	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 3 gpm.
28aa	..do...	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 2 gpm.
30aad	Anna Shannon	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 0.5 gpm.
30bb	Wesley King	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 4 gpm.
31cc	..do...	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	Wa, F 3 gpm.
32bbb	..do...	90	5.5	Dr	1908	80	1964	N	Lg	.....	.....	.....	Wh.
33ab	J. E. & A. E. King	Spring	.....	..	.....	F	1964	D,S	Lg	.....	.....	.....	F 3 gpm.
33bb	..do...	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 4 gpm.
33cd	..do...	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 5 gpm, T 48°.
154-99													
2ccc	Rudolph Lind	26	16	B	1952	19	1964	S	Gv	Cy,E	.....	.....	Lpc.
2ccd	..do...	130	4	Dr	1957	100	1964	D,S	Cl	E	.....	.....	Wh, T 48°.
5b	Charles Bibler	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	F greater than 100 gpm.
7db	Otto Boss	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 1 gpm.
12dad1	C. O. Rennerfeldt	140	3	Dr	.....	105.72	6-4-64	D,S	Lg	Cy,E	.....	.....	Wh, T 46°.
12dad2	..do...	141	4	Dr	1963	111	1964	D	..	N	.....	.....	Wh.
18baa1	Otto Boss	80	24	B	1920	.....	.....	S	Gv	Cy,E	.....	.....	Wh, Lpc.
18baa2	..do...	10	48	Du	1960	7	1964	S	Lg	Cy,G	.....	.....	Wh, Lpc.
22abb1	T. O. Harstad	50	4	Dr	1961	40	1964	D	Sd	J,E	.....	.....	Lpc.
22abb2	..do...	98	6	Dr	1954	75	1964	S	..	Cy,E	.....	.....	Wh.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
154-99, Cont.													
24abb	E. O. Tofte	196	4	Dr	1962	181	1964	D,S	Lg,Sd	Sb,E	.....	.....	Wh (325 ppm).
26bab	C. A. Vold	190	6	Dr	1949	160	1964	S	..	Cy,E	.....	.....	Ws, T 47°.
27cca	L. O. Hagen	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	F 4 gpm, T 45°.
27ccd	..do...	12	36	Du	.....	10	1964	S	Lg	Cy,H	.....	.....	Ws.
27dca	..do...	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 2 gpm.
28bdd	O. O. Hanson	65	24	B	1915	.....	.....	S	Lg	Cy,G	.....	.....	Wh.
28cdd	J. W. Lynch	110	5-3	Dr	1934	.....	.....	S	..	Cy,E	.....	.....	Ws.
28dab	O. O. Hanson	200	5	Dr	1962	190	1964	S	Lg	Cy,E	.....	.....	
29ddd	J. W. Lynch	73	24	B	1916	69	1964	S	Lg	Cy,E	.....	.....	Wh, T 47°, Lpc.
30ad	Brunelle Est.	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	Ws, Wa.
31ddd	..do...	235	4	Dr	1925	217	1964	S	..	Cy,E	.....	.....	Ws, Np.
32bcc	Alfred Tofte	25	24	Du	1910	.....	.....	S	Lg	Cy,E	.....	.....	Wh, Np, Lpc.
32cb	..do...	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	Wh.
34bcb	A. H. Holm	Spring	.....	..	.....	F	1965	S	Lg	.....	.....	.....	F 5 gpm, C.
34bcc	..do...	20	16	Du	.....	18	1965	D	Lg	E	.....	.....	Np.
154-100													
5bcc1	R. R. & B. K. Smith	65	6	Dr	1960	33	1960	D,S	Lg	Cy,E	.....	.....	Ws.
5bcc2	..do...	122	.....	..	.....	80	1965	D,S	Gv	.....	.....	.....	
7abb	Test hole 5-776	74	4.75	Dr	6-61	.....	.....	...	..	.....	.....	1,892	IM.
10abd	R. J. Nelson	60	4	..	.....	50	1964	D,S	Sd	Sb,E	.....	.....	Ws.
11cbd	M. D. Knoshaug	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	
13ca	M. E. Kirkpatrick	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 0.5 gpm.
14cbb	M. D. Knoshaug	20	36	Du	.....	13	1964	D,S	Gv	Cy,E	.....	.....	Wh.
19bad	H. A. Lund	50	5	Dr	.....	30	1964	D	Sd	J,E	.....	.....	
20bba	Dakota Salt Co.	48	12	Dr	1959	38	1965	Ind	..	Tu,E	14,100	.....	C, Y 170 gpm from bba and bbb.
20bbb	..do...	51	12	Dr	.....	38	1965	Ind	..	Tu,E	87,400	.....	C.
20ccd	E. Burdick	170	4	Dr	1962	110	1962	N	Sd	Cy,E	.....	.....	L.
21bcc	Miles Knutson	115	5	Dr	1957	95	1964	S	Lg	Cy,E	.....	.....	Ws, Wa, Np.
21bcd	A. K. Fedorenko	116	4	Dr	.....	90	1965	S	Gv	Cy,E	.....	.....	
21ddd	Edward Jenner	12	36	Du	.....	9	1964	D	Gv	J,E	.....	.....	Wh (274 ppm), Lpc.
22a	N. M. Ray	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 0.75 gpm.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
154-100, Cont.													
22aaa	N. M. Ray	18	24	Du	1953	8	1964	Cl	J,E	.....	.....	.....	
27abal	R. W. Foster	20	5	B	1962	10	1964	...	Gv	Cy,H	.....	.....	Lpc.
27aba2	..do...	60	5	Dr	1962	48	1964	D	Lg	J,E	.....	.....	Wh, Lpc.
28bcc	Test hole 27-776	52	4.75	Dr	8-61	.....	.....	T	..	.....	.....	1,880	LM.
29dbd	Test hole 28-776	42	4.75	Dr	8-61	.....	.....	T	..	.....	.....	1,850	LM.
35ba	Anna Skurdal	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	F 6 gpm.
154-101													
1ccd	Test hole 24-776	147	4.75	Dr	7-61	.....	.....	T	..	.....	.....	1,880	L.
1dcc	Harold Jeffrey	149	4	Dr	1949	20	1965	D	Gv	J,E	.....	.....	C.
2ad	Lee Allen	110	4	Dr	1950	60	1964	S	Gv	Cy,E	.....	.....	Wh.
2bbb	E. J. Hagen	35	24	B	1966	F	6-22-66	S,Irr	Lg	.....	.....	961	C.
2bcb	..do...	53	24	B	1966	F	6-22-66	S,Irr	..	.....	.....	1,180	C.
2ccc	Test hole 1-776	220	4.75	Dr	6-61	.....	.....	T	..	.....	.....	1,958	LM.
2cddl	Test hole 3-776	189	4.75	Dr	6-61	.....	.....	T	..	.....	.....	1,940	L.
2cdd2	C. H. Visina	156	.....	Dr	.....	86	1964	D	Gv	Sb,E	.....	.....	L.
9dcd	Aesoph Barkie	138	4	Dr	1964	.....	.....	D	Lg,Gv	Sb,E	.....	.....	Wh.
12aaa	Test hole 4-776	231	4.75	Dr	6-61	.....	.....	T	..	.....	.....	1,855	LM.
12bbal	Cloyd Wegley	20	48	Du	.....	12	1965	D	Gv	Cy,E	.....	.....	
12bba2	..do...	60	4	Dr	1962	48	1964	Irr	Gv	Tu,E	.....	.....	Y 40 gpm.
12bba3	Test hole 2-776	147	4.75	Dr	6-61	.....	.....	T	..	.....	.....	1,880	LM.
12bbb	Test hole 32-776	158	4.75	Dr	8-61	.....	.....	T	..	.....	.....	1,889	L.
12bbd	Test hole 23-776	136	4.75	Dr	7-61	.....	.....	T	..	.....	.....	1,880	L.
15bbd	E. J. Hagen	7	30	Du	.....	1	1964	D,S	Gv	J,E	.....	.....	Wh, Wa.
16aa	..do...	160	4	Dr	1962	80	1964	S	..	Sb,E	.....	.....	Wh.
21aa	..do...	160	4	Dr	1962	60	1964	S	..	Sb,E	.....	.....	Wh.
21ddd	Borshiem Builders Supply Inc.	65	18	B	.....	20	1965	Ind	Gv	Tu,E	1,670	.....	T 47°, C.
23cbc	Montana-Dakota Utility Co.	661	10	Dr	1954	48	1965	Ind	Sd	Sb,E	.....	.....	Td 665 ft, L.
24bad	Williston Clinic	143	10	Dr	1954	75	1954	D	Gv	Tu,E	.....	.....	Y 300 gpm, L.
24cbb	Farmers Union Creamery	219	10	Dr	1928	34	1965	Ind	Gv	Tu,E	.....	1,880	Y 200 gpm, L.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
154-101, Cont.													
24cca	Peterson's Creamery	163	5	Dr	1955	45	1965	Ind	Sd	J,E	.....	.....	C, Y 25 gpm.
26cca	U.S. Corp of Engineers 301	125	.....	..	1954	.....	.....	T	..	.....	.....	1,843	L.
28bad	Andy Manz	120	6	Dr	1963	10.29	10-21-65	Irr	..	Sb,E	.....	.....	Y 100 gpm.
28bdc	U.S. Corp of Engineers 171	55	.....	..	1953	.....	.....	T	..	.....	.....	1,844	L.
28cba	U.S. Corp of Engineers 172	45	.....	..	1953	.....	.....	T	..	.....	.....	1,844	L.
29dcc	U.S. Corp of Engineers 994	57	.....	..	1953	.....	.....	T	..	.....	.....	1,847	L.
31add	U.S. Corp of Engineers 999	143	.....	..	1953	.....	.....	T	..	.....	.....	1,848	L.
32bab	U.S. Corp of Engineers 1077	225	.....	..	1954	.....	.....	T	..	.....	.....	1,845	L.
32bbd	U.S. Corp of Engineers 997	204	.....	..	1953	.....	.....	T	..	.....	.....	1,846	L.
154-102													
3add	Gladys Larson	90	18	B	.....	80	1965	S	..	Cy,E	.....	.....	Lpc.
6ccc	Albert Anderson	33	24	B	1945	20	1965	D	Sd	Cy,E	1,250	.....	Wa, T 44°.
14ddd	C. E. Strand	152	6	Dr	1949	100	1965	D,S	Sd	Cy,E	1,290	.....	T 47°.
17cdd	W. O. Mortonson	208	6	Dr	.....	168	1957	D,S	Sd	Sb,E	2,400	.....	
19ccd	J. D. Sathra	182	4	Dr	.....	147	1965	S	..	Cy,E	3,800	.....	T 48°.
19cdc	..do...	210	4	Dr	.....	180	1965	D,S	Lg	Sb,E	3,150	.....	Ws (51 ppm).
21ddd	P. F. Higgins	60	5	Dr	.....	55	1965	D,S	Sd	J,E	.....	.....	
22ccc	..do...	68	5	Dr	1963	42	1965	D	..	Sb,E	3,200	.....	
25aac	N. Dak. Experiment Station	100	4	Dr	1957	90	1962	D	..	Sb,E	.....	.....	
25abd1	..do...	110	4	Dr	1957	92	1962	D	..	Sb,E	680	.....	C.
25abd2	..do...	335	.....	Dr	1957	.....	.....	T	..	.....	.....	.....	
26dcd	Arthur Greaves	65	6	Dr	1915	60	1965	D,S	Sd	Cy,E	420	.....	T 45°.
29aaa	Clinton Beard	18	72	Du	.....	6	1965	D,S	..	J,E	.....	.....	T 45°, Lpc.
29daa	Robert Beard	210	4	Dr	1965	89.47	7-22-65	S	..	Sb,E	3,300	.....	Wh (496 ppm), T 48°.
34dc	E. W. Hansen	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	F 4 gpm.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
154-103													
2baa	Owen Heller	100	.....	Dr	1948	60	1964	D,S	Cl	Cy,E	.....	.....	Wa, C.
3abb	J. G. Arnstad	78	.....	B	1910	77	1964	D,S	Lg	Cy,E	.....	.....	Wh (120 ppm), Lpc.
4aba	Wayne Johnson	110	6	Dr	1911	85	1964	D,S	Lg	Sb,E	.....	.....	Wh, Lpc.
4ccc	Lloyd Oyloe	65	6	Dr	1948	34	1964	D,S	Lg	Sb,E	.....	.....	Wh.
7bbb1	O. S. Haugen	15	.....	Du	1910	12	1964	S	Lg	Cy,E	.....	.....	Wh, Lpc.
7bbb2	..do...	40	4	Dr	1963	22	1964	D,S	Lg	E	.....	.....	Wh.
7bbb3	..do...	85	4	Dr	1963	64	1964	S	Lg	Cy,E	.....	.....	
9cbb	Test hole	20	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,247	L.
10dcc	Anna Jellison	120	.....	Dr	1908	.....	.....	D	..	Cy,E	.....	.....	Wh.
13bdb	A. G. Anderson	90	24-1.25	Dr	1930's	85	1964	D,S	Lg	Cy,E	.....	.....	Wh, Lpc.
16bcc	Harold Oyloe	60	6	Dr	1952	.....	.....	D	..	E	.....	.....	Wh.
16ddd	C. E. Anderson	72	24	Dr	1952	64	1964	D,S	Sd	E	.....	.....	Wh.
17dd	Ernest Larson	38	6	B	1948	.....	.....	D	Lg	J,E	.....	.....	Wh.
17ddd	Test hole	60	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,247	L.
19cbb	Lloyd Braaten	60	24	B	1904	50	1964	N	..	Cy	.....	.....	Wh.
19ddd	Carl Haugen	24	8	Dr	1949	12	1964	D,S	..	E	1,800	.....	Wh, T 54°, C.
22bbb	R. A. Anderson	24	18	B	1927	18	1964	D,S	Lg,Sd	E	.....	.....	Wh.
28cdd	C. O. Anderson	125	6	Dr	1963	100	1964	D,S	..	Sb,E	.....	.....	
30baa	William Brunelle	200	.....	Dr	1962	180	1964	D,S	..	Cy,E	.....	.....	Wh (120 ppm).
30ccb	Ora Ellingson	350	4	Dr	1962	210	1964	D,S	Sd	Sb,E	.....	.....	Ws, C.
34bbd	C. J. Nehring	60	6	Dr	.....	.....	.....	S	..	Cy,E	.....	.....	Wh, Wa, Lpc.
154-104													
12abc1	Bryon Haugen	50	2	Dr	1922	.....	.....	S	Lg	Cy	.....	.....	Ws.
12abc2	..do...	72	4	Dr	1960	44	1964	S	Lg	J,E	.....	.....	Ws.
23ddd1	W. M. Christianson	162	4	Dr	1963	102	1964	D	Sd	Sb,E	.....	.....	Ws (103 ppm).
23ddd2	..do...	48	24	B	1947	32	1964	S	Lg	Cy,E	.....	.....	Wh (564 ppm).
24daa	Lloyd Braaten	260	6	Dr	1923	160	1964	D,S	..	Cy,E	.....	.....	Ws.
155-95													
2cbb	Olaf Opedahl	100	15	B	.....	60	1964	S	Sd	Cy,E	.....	.....	Wh.
3bcb	Clinton Bergstrom	75	4	Dr	1958	50	1964	S	Sd	Cy,E	1,160	.....	Wh, C.
4ada	O. J. Bergstrom	92	4	Dr	6-65	.....	.....	D	Sd	Sb,E	.....	.....	L.
4add	..do...	86	24	B	1946	70	1964	D	Sd	Cy,E	.....	.....	Wh.
4ddd	W. L. Eide	106	24	B	1924	88	1964	D,S	Lg	Cy,E	.....	.....	Wh, Lpc.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
155-95, Cont.													
5bbd1	L. A. Ramberg	60	4	Dr	1945	.....	.....	N	Lg	Cy	.....	.....	Np.
5bbd2	..do...	180	6	Dr	1952	50	1964	D,S	..	Sb,E	.....	.....	Wh.
7cd	Amerada Petr. Corp.	5,040	13-7	Dr	1959	584	1959	PM	Ss	Tu,G	.....	2,368	T 140°, C.
9bb	Wilber Eide	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	Wh, F 1.5 gpm.
14cdb	Olaf Kjerstad	39	30	Du	.....	34	1964	S	Lg	Cy,E	.....	.....	Wh.
25cc	R. E. Marmon	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	
32ddc1	Chester Halvorson	10	18	B	1948	7	1964	D,S	Gv	E	2,560	.....	Wh, C.
32ddc2	..do...	20	18	B	1948	8	1964	D	Gv	Cy,E	.....	.....	Wh.
34ddc	Harry Rodahl	21	6	..	.....	13	1964	D,S	Gv	Cy,E	.....	.....	
35aaa	R. E. Marmon	35	24	B	.....	29	1964	N	Lg	.....	.....	.....	Wh, Wa.
35dab	..do...	73	4	Dr	1956	43	1964	D,S	Sd	Cy,E	.....	.....	Wh.
155-96													
1bc	Amerada Petr. Corp.	4,647	.....	Dr	.....	.....	.....	OT	..	.....	.....	.....	T 143°, C.
1bcc	M. Iverson	100	18	B	1908	82	1964	D,S	..	Cy,E	.....	.....	Wh.
5aa	Lester Olson	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	F 4.5 gpm.
7ccc	Test hole	94	4.75	Dr	12-64	.....	.....	T	..	.....	.....	2,183	L.
13da	Alvin Iverson	Spring	.....	..	.....	F	1964	N	Ss	.....	.....	.....	F 2 gpm.
15aa	Amerada Petr. Corp.	4,925	13-9	Dr	1958	725	1963	PM	Ss	Tu,G	.....	2,231	T 140°, C.
15abb	Sam Olson	20	36	Du	1954	17	1964	D,S	Lg	Cy,H	.....	.....	Wh.
20ada	Merle Mattson	25	6	Dr	1953	.....	.....	D	Lg	J,E	.....	.....	Ws.
20ddd	Test hole	52	4.75	Dr	12-64	.....	.....	T	..	.....	.....	1,950	L.
23dad	H. J. Udland	70	18	B	1963	63	1964	D	Lg	Cy,E	.....	.....	
25dba1	D. L. Anderson	95	6	Dr	1955	65	1964	D	Lg	Sb,E	.....	.....	Wh.
25dba2	..do...	27	36	Du	.....	7	1964	S	..	E	.....	.....	Wh, Lpc.
29adb	Franklin Weyrauch	60	4	Dr	1953	10	1964	D	Lg	E	.....	.....	Wh.
29aca	..do...	35	18	B	.....	20	1964	S	Lg	Cy,G	.....	.....	Wh, Wa.
30bb	Verland Hartsoch	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 1 gpm.
30bcc	Test hole	42	4.75	Dr	12-64	.....	.....	T	..	.....	.....	2,000	L.
31add	W. N. Sveen	180	4	Dr	1945	140	1964	S	..	Cy,E	.....	.....	Wh.
155-97													
1bbb	Reuben Olson	115	4	Dr	1907	51	1964	D,S	Lg	Cy,E	.....	.....	
2aaa	Test hole	108	1.25	Dr	12-64	66.20	6-10-65	O	Sd,Gv	N	.....	2,190	Td 126 ft, L, Wl.
2abd	R. A. Olson	115	2.75	Dr	.....	.....	.....	D,S	Cl	Cy,E	.....	.....	

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
155-97, Cont.													
2bbb	Test hole	94	4.75	Dr	11-64	.....	.....	T	..	.....	.....	2,278	L.
2cbb	Olaf Opedahl	81	15	B	1963	60	1964	D,S	Sd	Cy,E	.....	.....	Wh.
5bbb	Test hole	178	4.75	Dr	11-64	.....	.....	T	..	.....	.....	2,414	L.
7bbb	Floyd Kindel	70	8	Dr	.....	60	1964	S	Lg	Cy,E	.....	.....	Wh, Lpc.
7ddd	..do...	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 2 gpm.
8adb	Clara Dixon	175	4	Dr	1910	.....	.....	N	Sd	Cy,H	.....	.....	Wh.
9aaa1	L. G. Allen	97	4	Dr	.....	75	1964	S	Lg	Cy,E	.....	.....	Wh.
9aaa2	..do...	130	4	Dr	.....	95	1964	D	Lg	J,E	.....	.....	Wh.
9dc	Clara Dixon	Spring	.....	..	.....	F	1964	S	Ss	.....	.....	.....	Wh.
11daa	Henry Grondale	220	4	Dr	1958	180	1964	D	Lg	Sb,E	.....	.....	Wh, Np.
12bcb1	M. O. Liesener	195	4	Dr	1950	160	1964	D	Lg	Cy,E	.....	.....	Wh, Wa.
12bcb2	..do...	180	4-3	Dr	1928	169	1964	S	Sd	Cy,E	.....	.....	Wh, Lpc.
15bb	N. E. Wagner	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 1 gpm.
17bbd	C. G. Larsen	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 2 gpm.
18aab	..do...	275	4	Dr	1958	260	1964	D	..	Cy,E	.....	.....	Wh.
23bac	Verland Hartsoch	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	Ws, F 100 gpm.
24adc	..do...	Spring	.....	..	.....	F	1964	D,S	Lg	.....	.....	.....	Ws, F 4 gpm.
27bcb	Lillian Wagner	16	60	Du	1924	2	1964	D,S	Lg,Sd	Cy,H	.....	.....	Wh, Lpc.
28aad	Gordon Wagner	Spring	.....	..	.....	F	1964	S	Sd	.....	.....	.....	F 1 gpm.
28bbb	..do...	245	4	Dr	.....	200	1964	D,S	Lg	Cy,E	.....	.....	Lpc.
28cdc	J. A. Hickel	267	2	Dr	.....	.....	.....	D,S	Lg	Cy,E	.....	.....	Wh.
29bcd	Arthur Jackman	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 5 gpm.
31bb	Clarence Jackman	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 6 gpm.
31dba1	..do...	100	4	Dr	1914	30	1964	S	Lg	Cy	.....	.....	Ws, Lpc, C.
31dba2	..do...	120	4	Dr	1959	40	1964	D,S	Gv,Lg	J,E	1,030	.....	Wh.
32bba	Arthur Jackman	164	2	Dr	1948	.....	.....	D,S	Lg	Cy,E	.....	.....	Ws.
35dcc	Wayne Vance	Spring	8	..	.....	F	1964	S	..	.....	.....	.....	Wh, Wa.
35dcd	..do...	65	4	Dr	1961	40	1964	S	Lg	Cy,E	.....	.....	Ws.
36dca1	Roy Viall	780	.....	Dr	1918	F	1965	D,S	..	N	3,380	.....	F 2 gpm, T 57°, C.
36dca2	..do...	60	4	Dr	.....	.....	.....	D	Gv	Cy,E	.....	.....	Wh, Lpc.
155-98													
2abb	J. A. Haugen	110	4	Dr	1948	.....	.....	D,S	Sd	J,E	.....	.....	Wh, Lpc.
7bbb	J. G. Hennegrefs	56	5	B	1930	8	1964	D,S	Lg,Sd	Cy,E	.....	.....	Wh, Wa.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
155-98, Cont.													
7bbc	J. G. Hennegrefs	Spring	.....	..	.....	F	1964	N	Sd	.....	.....	.....	F 4 gpm.
9aaa	A. M. Johnson	156	4	Dr	1947	141	1964	D,S	..	Cy,E	.....	.....	Wh.
11aaa	T. A. Jarland	40	.....	B	1940	.....	.....	D	Sd	Cy,H	.....	.....	Wh.
12aaa	Floyd Kindel	70	12	B	.....	60	1964	S	Lg	Cy,H	.....	.....	Wh, Lpc.
12bbb	J. A. Haugen	75	24	B	1914	62	1964	D,S	..	Cy,E	.....	.....	Lpc, T 45°.
15dbb1	T. A. Lindquist	40	18	B	.....	18	1964	S	..	Cy,W	.....	.....	Wh.
15dbb2	..do...	40	6	Dr	.....	30	1964	S	Lg	Cy,E	.....	.....	Wh, T 44°.
15dbb3	..do...	140	6	Dr	1954	125	1964	D	Lg	J,E	.....	.....	Wh (564 ppm).
18bbd1	Charles Alexander	21	6	Dr	1945	13	1964	N	Sd	Cy,H	.....	.....	Wh, Lpc.
18bbd2	..do...	41	4	Dr	1949	13	1964	D,S	Lg	J,E	.....	.....	Wh.
22baa	S. R. Siverson	65	4	Dr	.....	25	1964	D	Lg	J,E	.....	.....	Wh.
22cdd	Woodrow Ritter	135	2	Dr	1904	115	1964	D,S	Lg	Cy,E	.....	.....	Wh.
23bbc	A. M. Johnson	90	4	Dr	1915	60	1964	N	Lg	Cy,H	.....	.....	Ws.
23ccb	Melvin Siverson	114	2	Dr	.....	82	1964	D	..	Cy,E	.....	.....	Ws.
24cbb1	Floyd Kindel	180	6	Dr	.....	130	1964	D,S	Sd,Gv	J,E	.....	.....	
24cbb2	..do...	150	6	Dr	1920	140	1964	S	Sd	Cy,E	.....	.....	Wh.
25aad	John Vernon	212	6	Dr	.....	190	1964	D,S	Sd	Cy,E	.....	.....	Wh.
25cdc	Woodrow Ritter	145	4	Dr	.....	115	1964	S	Lg	Cy,G	.....	.....	Wh.
26bbc	C. R. Hussey	50	4	Dr	1930	20	1964	D,S	..	Cy,E	.....	.....	Wh.
28ddd	Melvin Siverson	81.2	4	Dr	.....	63.17	6-22-64	O	..	N	.....	.....	Wl.
30cdc1	LeRoy Seaton	50	10-6	Dr	1954	25	1964	D,S	Lg	J,E	.....	.....	Wh, T 47°.
30cdc2	..do...	74	5	Dr	1915	50	1964	S	Lg	Cy,W	.....	.....	Wh.
33cbb	A. E. Bean	70	6	Dr	1932	35	1964	D,S	Lg	Cy,E	862	.....	Wh, C.
34aad	Clair Amsberry	113	4	Dr	1941	93	1964	D,S	Lg	Cy,E	.....	.....	Wh (1,197 ppm).
36aa	S. R. Gjorven	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	F 6 gpm.
36cc	State of N. Dak.	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	F 20 gpm.
155-99													
1abc	Test hole	100	4.75	Dr	5-66	.....	.....	T	..	.....	.....	2,216	L.
1bcc	Epping school	61	4	Dr	1963	34	1965	Ps	..	Cy,E	1,070	.....	C.
1bdb	Harley Hutchins	56	6	Dr	1963	36	1964	D	..	Cy,E	.....	.....	T 46°.
1bdd	Farmers Union Oil Co.	85	6	Dr	1926	50	1964	D	..	J,E	.....	.....	Wh.
1caa	Clara Vinge	89	.....	Dr	1929	.....	.....	S	..	Cy,E	.....	.....	Wa.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
155-99, Cont.													
1dab	R. L. Hambleton	50	4	Dr	.....	39	1964	D,S	..	Cy,W	.....	.....	Wh, T 45°.
1dad	..do...	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	Wh, F 3 gpm, T 46°.
3bdd1	D. A. Morrow	40	18	B	1963	28	1963	D	..	E	.....	.....	Wh, Wa.
3bdd2	..do...	70	6	Dr	1941	50	1964	S	Sd	Cy,E	.....	.....	T 45°.
9add	Luthern Bible Camp	52	4	Dr	1959	30	1964	D	..	J,E	.....	.....	Wh (410 ppm), Wa.
10dab	Miles Knutson	20	9	Dr	1956	15	1964	N	Lg	N	.....	.....	Wh.
12aab	A. T. Ellingson Est.	Spring	.....	..	.....	F	1964	D	..	.....	.....	.....	Wh, Wa, F 5 gpm, T 45°.
13bcb	Cora Arcand	60	4	Dr	.....	45	1964	D	Lg	Cy,E	.....	.....	Wh.
14ddd	L. D. Hannegrefs	35	6	Dr	1942	16	1964	D,S	Lg	Cy	.....	.....	Wh, T 45°.
15bbb	Theodore Torkelson	80	4	Dr	1950	.....	.....	D	..	E	.....	.....	Wh.
18aac	Ralph Truax	53.8	4	Dr	.....	33.96	6-5-64	O	..	N	.....	.....	Wl.
18abd	Test hole	60	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,062	
18baa	George Friess	76	.....	Dr	1964	36	1964	D	Lg	E	.....	.....	Ws.
18bdc	Kenneth Bellet	55	6	Dr	.....	48	1964	S	Lg	Cy,E	.....	.....	Wh.
18cab	Leonard Zimmer	69	4	Dr	1957	34	1964	D	Lg	Cy,G	.....	.....	Ws.
23aaa1	J. J. Hannegrefs	40	4	Dr	1950	12	1964	D	Lg	J,E	.....	.....	Wh.
23aaa2	..do...	18	4	B	1945	5.66	6-4-64	D	Lg	E	.....	.....	Wh, T 46°.
24ada	Eva Urban	137	6-4	Dr	.....	110	1964	D	Lg	Cy,E	.....	.....	Wh, T 46°.
25bcc	Kermit Knutson	125	6	Dr	1928	.....	.....	D,S	Lg	Cy,E	.....	.....	
26add	Donald Knutson	185	4	Dr	.....	175	1964	D	Lg	Cy,E	.....	.....	Wh, Lpc.
27ba	Sam Arcand	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	Wa, F 1 gpm.
31a	C. A. Bibler	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	F 2 gpm.
32c	..do...	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	F 20 gpm.
155-100													
6aaa1	Layons Brothers	65	7	..	.....	12	1959	D	Sd	Cy	.....	.....	
6aaa2	Test hole 1425	126	4.75	..	.....	.....	.....	T	..	.....	2,480	1,880	L,C.
7dcb	Harry Vackstrom	66	5	Dr	1956	8	1964	D	Lg	J,E	.....	.....	Ws, T 48°.
9aac	W. R. Brown	15	36	Du	1953	11	1964	D	Gv	J,E	.....	.....	Wh.
9aad	..do...	80	4	Dr	1920	67	1964	S	Gv	Cy,E	.....	.....	Wh.
9ccd	Spencer Strang	51.6	6	Dr	.....	47.77	7-14-64	O	Gv	.....	.....	.....	Wl.
10bcc	Pherrin Township	220	4.75	Dr	11-61	.....	.....	T	..	.....	.....	1,930	L.
12dad	L. E. Simler	80	4	Dr	1914	.....	.....	D,S	Sd	Cy,E	.....	.....	Wh.
13ccc	Albert Grimmer	26	6	Dr	.....	.....	.....	...	Gv	J,E	.....	.....	Wh.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
155-100, Cont.													
13dca	John Beard	55	4	Dr	.....	50	1964	S	Lg	Cy,E	.....	.....	
15baa	L. A. Strang	97	.....	Dr	1948	80	1964	D	..	Cy,E	.....	.....	Wh (449 ppm).
17adc	Pherrin Township	220	4.75	Dr	11-61	.....	.....	T	..	.....	.....	1,880	L.
17bcc	..do...	140	4.75	Dr	11-61	.....	.....	T	..	.....	.....	1,870	L.
17ccd1	J. M. Richman	20	6	Dr	1961	17	1964	D	Sd	J,E	.....	.....	Wh.
17ccd2	..do...	20	6	Dr	1953	17	1964	S	Sd	J,E	.....	.....	Ws.
18dbb	Pherrin Township	40	4.75	Dr	11-61	.....	.....	T	..	.....	.....	1,900	L.
19abc1	R. S. Lindvig	25	4	Dr	1963	10	1964	D	Gv	Cy,E	.....	.....	Wh, T 44°.
19abc2	..do...	22	2	Dv	1923	6	1964	S	Gv	Cy,E	.....	.....	Wh.
19abc3	..do...	16	4	Dr	1963	6	1964	S	Gv	Cy,E	.....	.....	Wh.
19baa	Test hole 10-776	158	4.75	Dr	6-61	.....	.....	T	..	.....	.....	1,890	IM.
19ddd	Pherrin Township	170	4.75	Dr	11-61	.....	.....	T	..	.....	.....	1,880	L.
20cab	..do...	160	4.75	Dr	11-61	.....	.....	T	..	.....	.....	1,880	L.
20ddd	Test hole 9-776	262	4.75	Dr	6-61	.....	.....	T	..	.....	.....	1,890	IM.
21bcc1	John Beard	48	4	Dr	1940	40	1964	S	Sd	Cy,E	.....	.....	Wh, Wa.
21bcc2	..do...	13	1.25	Dv	.....	11	1964	D	Sd	J,E	.....	.....	
21bdd	Pherrin Township	195	4.75	Dr	11-61	.....	.....	T	..	.....	.....	1,920	L.
22ba	Dale Brokaw	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 30 gpm.
24baa	Pherrin Township	60	4.75	Dr	11-61	.....	.....	T	..	.....	.....	2,037	L.
24bac	..do...	60	4.75	Dr	11-61	.....	.....	T	..	.....	.....	2,036	L.
27bda	Dale Brokaw	210	4	Dr	1948	193	1964	D,S	Lg	Cy,E	.....	.....	Ws.
29aa	John Beard	52	4	Dr	1905	42	1964	N	Lg	Cy	.....	.....	Wh.
29bcc1	E. A. Rolfstad	66	6	Dr	1962	29	1964	D	Gv	J,E	.....	.....	Wh (272 ppm).
29bcc2	..do...	31	36-2	Du-Dv	1917	25	1964	D,S	Lg	Cy,E	.....	.....	Wh (357 ppm).
29ccc	School Dist. No. 8	60	6	Dr	1956	20	1964	D	Gv	Cy,H	.....	.....	Wh (308 ppm).
29cdd	J. W. Shae	30	6	Dr	1958	.....	.....	D	Sd	E	.....	.....	
30cda	H. T. Rolfstad	10	36	Du	1963	8	1964	S	Sd	Cy,H	.....	.....	Ws.
30dab	Pherrin Township	160	4.75	Dr	11-61	.....	.....	T	..	.....	.....	1,885	L.
30ddc	Test hole 1436	28	4.75	Dr	1958	.....	.....	T	Gv	.....	1,560	.....	Td 52 ft, L, C.
31aba	Test hole 8-776	168	4.75	Dr	6-61	.....	.....	T	..	.....	.....	1,872	IM.
31add	Ardell Lindahl	44	4	Dr	.....	42	1964	D,S	Gv	J,E	.....	.....	Wh.
31bbb	Test hole 1435	90	4.75	Dr	10-58	.....	.....	T	..	.....	1,590	1,880	TD 116 ft, L, C.
31daa1	Pherrin Township	200	4.75	Dr	11-61	.....	.....	T	..	.....	.....	1,880	L.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
155-100, Cont.													
31dad	Gerhard Huebner	38	4	Dr	1961	23	1964	D,S	Gv	J,E	.....	.....	Wh.
32ada	Test hole 6-776	74	4.75	Dr	6-61	.....	.....	T	..	.....	.....	1,950	IM.
32baa	Test hole 7-776	294	4.75	Dr	6-61	.....	.....	T	..	.....	.....	1,900	IM.
32bcc	Ardell Lindahl	54	6	Dr	1915	32	1964	D,S	Sd	J,E	.....	.....	Wh.
32cdc	Pherrin Township	150	4.75	Dr	11-61	.....	.....	T	..	.....	.....	1,900	L.
34cca	Lee Allen	176	4	Dr	.....	.....	.....	S	Lg	Cy,E	.....	.....	Wh.
155-101													
1bbb	Test hole 1434	63	4.75	Dr	10-58	.....	.....	T	..	.....	.....	1,980	L.
2ada	Mike Albert	97	5	Dr	1948	89	1959	D	Gv	E	.....	.....	
3bbb1	Frank Honek	60	4	Dr	1959	25	1964	D	Lg	Cn,E	.....	.....	Wh, Wa.
3bbb2	..do...	18	30	Du	.....	14	1964	D	Lg	Cy,W	.....	.....	Wh.
3daa	P. J. Booke	50	5	Dr	.....	46	1964	S	..	Cy	.....	.....	Wh, Wa.
4bba	George Holmes	52	4	Dr	1964	41	1964	S	Lg	Sb,E	.....	.....	
6ccc	C. A. Wicks	125	14	Dr	.....	50.41	7-21-65	S	Sd	Cy,E	3,400	.....	T 48°.
9bc	R. J. Rieder	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	
10aca	R. A. Rieder	60	4	Dr	1928	40	1964	D,S	Lg	Cy,E	.....	.....	Wh.
10bcc	G. B. Franke	111	4	Dr	1944	107	1964	D,S	..	Cy,E	.....	.....	Lpc.
11ddb	Walter Lukenbill	118	4	Dr	1944	111	1964	D,S	..	J,E	.....	.....	Ws, Lpc.
13abb1	Test hole 11-776	63	4.75	Dr	6-61	.....	.....	T	..	.....	.....	1,940	IM.
14add	Walter Lukenbill	60	5	Dr	1929	20	1959	...	Sd	Cy	.....	.....	Ws.
17bac	Allet Anderson	140	24	B	1928	110	1964	N	Lg	Cy,H	.....	.....	Wh.
18aaa	P. J. Booke	100	18	B	.....	.....	.....	S	..	Cy,E	.....	.....	Wh.
18aba	L. H. Poe	128	4	Dr	1953	70	1964	D,S	..	Sb,E	.....	.....	Wh.
18bbb	..do...	25	.....	Du	.....	20	1964	N	..	.....	.....	.....	Ws.
19dad	Allet Anderson	40	24	B	1928	30	1964	D,S	..	Cy,E	.....	.....	Lpc.
20aca	O. C. Booke	175	6-4	Dr	1951	165	1964	D,S	Lg,Gv	Cy,E	.....	.....	
20bbc	..do...	129	4	Dr	1956	.....	.....	D	Lg	Sb,E	.....	.....	Y 20 gpm, C.
21ddb	Walter Lukenbill	58.5	24	B	.....	54.62	7-22-64	N	..	.....	.....	.....	
22cca	Test hole 31-776	84	4.75	Dr	8-61	.....	.....	T	..	.....	.....	2,120	L.
22dda	Norman Johnson	137	4	Dr	1964	107	1964	S	Gv	Cy,G	.....	.....	Wh.
23bbb	..do...	45	6	Dr	1940	32	1964	D,S	Lg	J,E	.....	.....	Wh.
24cdc	Kermit Smith	.....	4	..	.....	22.54	5-12-64	O	Sd	N	.....	.....	Wl.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
155-101, Cont.													
24ddd	Leonard Winters	72	.....	Dr	.....	.....	.....	...	..	.....	1,510	.....	C.
25cbb	Vernon Oyloe	85	5	Dr	.....	60	1964	D	Lg	Sb,E	.....	.....	
26add	Morris Hermanson	115	4	Dr	1952	103	1964	D	Lg	J,E	.....	.....	Wh.
26daa	K. I. Heen	125	4	Dr	.....	100	1964	S	Lg	Cy,E	.....	.....	Wh.
27cbb	Irving Strand	150	4	Dr	.....	145	1964	D,S	Lg	J,E	.....	.....	Wh.
35ccc1	Agnes Cherrey	97	6	Dr	1948	82	1964	D,S	Gv	J,E	.....	.....	
35ccc2	..do...	57.5	24-18	B	.....	50.44	7-23-64	N	..	Cy	.....	.....	
35dcc	K. I. Heen	60	4	Dr	1956	48	1964	D,S	Lg	Sb,E	.....	.....	Wh (493 ppm).
36bbd	Robert Andrea	16	4	Dv	1953	6	1959	D,S	Sd	E	.....	.....	
36bcc	Lake Park	Spring	.....	..	.....	F	1965	...	..	.....	1,230	.....	C.
36dac	Test hole 33-776	136	4.75	Dr	8-61	.....	.....	T	..	.....	.....	1,885	IM.
155-102													
6cca	H. J. Hanson	120	4	Dr	.....	100	1965	S	..	Cy,E	3,250	.....	Lpc.
7ddc	Haaken Jorgenson	110	6	B	1907	94	1965	S	Sd	Cy,E	.....	.....	Lpc.
8bbb	H. M. Hanson	50	24	B	.....	35	1965	S	Lg	Cy,E	640	.....	
8dda	E. H. Jorgenson	52	4	Dr	1953	20	1965	D	Lg	J,E	1,090	.....	Wh, C.
8ddb	..do...	30	3.5	Dr	1950	12	1965	S	Lg	Cn,E	.....	.....	
9dda	Joseph Barkie	60	24	B	1941	50	1965	D,S	Lg	Cy,E	.....	.....	
17add	H. J. Jorgenson	100	4	Dr	1948	84	1965	D,S	Sd	Cy,E	1,750	.....	Wh.
20bca	Lars Larsen	20	4	B	.....	18	1965	D	Lg	Cn,E	.....	.....	Wh.
26abb	John Nordtug	18	48	Du	.....	14	1965	D,S	Sd	J,Cy,E	1,000	.....	
28bbb	H. L. Shaffer	90	6	Dr	1949	.....	.....	D	Sd	Cy,G	.....	.....	Lpc.
29ddd	E. A. Johnson	137	18	B	1928	100	1965	S	..	Cy,E	3,400	.....	Wh, Np, T 48°.
32ccc	Elvin Olson	40	24	B	.....	20	1965	D,S	..	Cy,E	3,590	.....	Wh, C.
32daa	Ben Olson	40	.....	Du	.....	27.94	7-22-65	S	..	Cy,E	2,500	.....	T 45°.
33ccc	Henry Flexhaug	36	24	B	.....	30	1965	S	Lg,Sd	Cy,E	6,000	.....	T 45°.
155-103													
1ddd	Alvin Hanson	100	.....	..	.....	.....	.....	D,S	..	Cy,E	.....	.....	Wh, Wa.
6ddc1	Olaf Knutson	24	.....	B	1910	.....	.....	D	..	E	.....	.....	Wh.
6ddc2	..do...	200	6	Dr	1954	.....	.....	S	..	Cy,E	.....	.....	Wh.
8add	Test hole	40	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,341	L.
8ccc	Norman Rockstad	75	.....	Dr	1958	60	1964	D,S	..	Cy	.....	.....	Wh.
9ccc	Obert Lee	100	.....	Dr	.....	.....	.....	S	..	Cy,E	.....	.....	Wh.
10caa	Burt Arnson	45	4	Dr	1955	20	1964	D	..	J,E	.....	.....	Wh.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
155-103, Cont.													
14aaa	Pernie Arnson	50	4	Dr	1954	27	1965	D,S	Lg	Cy,E	.....	.....	
14aad	..do...	80	6	Dr	1949	28	1965	D	..	Cy,E	.....	.....	
14bdd	Arthur Lee	Spring	.....	..	.....	F	1965	S	..	.....	.....	.....	Wa, Y > 210 gpm.
15bbb	Olaf Lee	90	.....	Dr	1963	.....	.....	D,S	..	E	.....	.....	Wh.
20add	Test hole	40	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,357	L.
22abc	Fred Miller	47	4	Dr	1951	22	1964	D,S	Lg	J,E	.....	.....	Wh, C.
25cdd	Leslie Holland	65	6	Dr	1943	23	1964	D,S	Lg	Cy,E	.....	.....	Ws.
30caa	Clarence Jacobson	80	4	Dr	1963	55	1964	D	..	Sb,E	.....	.....	Wh (2,108 ppm).
32ddd	Ed Anseth	175	6	Dr	1922	135	1964	S	..	Cy,E	.....	.....	Ws.
33bcc	Carl Wiseman	117	24	B	.....	97	1965	D,S	Sd	Cy,E	936	.....	C.
33cbb	Test hole	120	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,321	L.
155-104													
1dcc	Paul Horob	85	6	Dr	1949	70	1964	D,S	..	Cy,E	.....	.....	Wh.
2aad	Estin Sulsky	113	4	Dr	1960	.....	.....	D,S	..	Cy	.....	.....	Wh, T 47°, C.
11acc	Fred Lemay	Spring	.....	..	.....	F	1964	D,S	..	.....	.....	.....	F 3 gpm, T 44°.
156-95													
5bbb	Test hole 732	70	5	Dr	5-53	6.56	5-26-53	T	..	.....	.....	2,256	TS.
6daa	Halliburton Co.	155	5	Dr	9-62	.....	.....	Ind	Sd	.....	.....	.....	Y 20-30 gpm, L.
6ddd	Test hole 733	40	5	Dr	5-53	16.39	5-26-53	T	..	.....	.....	2,304	TS.
7ddd	Test hole 734	50	5	Dr	5-53	11.08	5-25-53	T	..	.....	.....	2,337	TS.
10ad	Amerada Petr. Corp.	.....	.....	Dr	1953	.....	.....	OT	..	.....	.....	.....	C.
18adb	..do...	5,139	20-7.5	Dr	1959	775	1964	PM	Ss	Tu,G	.....	2,360	T 140°.
18ddd	Test hole 735	40	5	Dr	5-53	13.38	5-25-53	T	..	.....	.....	2,377	TS.
19ddd	Test hole 736	70	5	Dr	5-53	.....	.....	T	..	.....	.....	2,396	L.
21aaa1	Nels Odegaard	92	4	Dr	.....	78	1964	S	..	J,E	.....	.....	Wh.
21aaa2	..do...	85	18	B	1962	65	1964	D	Gv	Sb,E	.....	.....	
22abb1	Edwin Heen	125	2	Dr	.....	.....	.....	D,S	..	Cy,E	.....	.....	Ws.
22abb2	..do...	175	4	Dr	1947	.....	.....	N	..	Cy,H	.....	.....	Wh.
27abb1	Tom Langved	117	4	Dr	1912	102	1964	D,S	Lg	Cy,E	.....	.....	Ws, Lpc.
27abb2	..do...	323	7	Dr	1963	220	1964	D,S	Lg	Sb,E	.....	.....	Ws.
28aaa	Roy Langved	120	30	B	1961	90	1964	S	..	Cy,E	.....	.....	Ws.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
156-95, Cont.													
28cbb	Carl Frisinger	160	4	Dr	1958	.....	.....	D,S	Lg	Cy,E	.....	.....	Wh.
29daa	M. C. Frisinger	300	6	Dr	1944	150	1964	D,S	..	Cy,E	.....	.....	Ws.
30ddd	Test hole 737	40	5	Dr	5-53	.....	.....	T	..	.....	.....	2,359	L.
35aaa	Lawrence Ramberg	120	3	Dr	1938	115	1964	D,S	..	Cy,E	.....	.....	Wh.
36bbb	..do...	47.3	24	B	.....	9.09	7-3-64	...	..	.....	.....	.....	Wh, Lpc, Wl.
156-96													
5abb	O. O. Holte	15	48	Du	1948	11	1964	N	Sd	Cy,G	.....	.....	Wh.
8adal	..do...	163	12	B	1913	153	1964	D	Lg	Cy,E	.....	.....	Wh.
8ada2	..do...	275	4	Dr	1950	.....	.....	S	Lg	Cy,E	.....	.....	Ws.
8cab	O. B. Foss	175	2	Dr	1908	165	1964	D,S	Gv	Cy,E	.....	.....	Ws.
20dad	W. R. Foss	125	4	Dr	1962	100	1964	D,S	Gv	Sb,E	.....	.....	Wh.
22bdc	Palmer Dilland	100	15	B	1963	84	1964	S	Lg	Cy,W	.....	.....	Wh.
25baal	..do...	340	4	Dr	1959	300	1964	S	St	Cy,E	.....	.....	Ws.
25baa2	..do...	27	36	Du	1954	25	1964	D	..	Cn,E	.....	.....	Wh.
25caal	James Fretland	42	21	B	1962	18	1964	D	Sd	Cy,H	.....	.....	Wh, Lpc.
25caa2	..do...	160	4	Dr	1934	140	1964	S	Lg	Cy,E	.....	.....	Wh, Lpc.
25cc	Amerada Petr. Corp.	5,141	9-7	Dr	1963	625	1963	PM	Ss	Tu,E	.....	2,357	T 140°.
31ccc	Test hole	32	4.75	Dr	12-64	.....	.....	T	..	.....	.....	2,140	L.
32dcb	W. W. Olson	35	4	Dr	.....	22	1964	S	Sd	Cy,E	.....	.....	
34aad	J. E. Ulven	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	F 2 gpm.
34add	..do...	98	4	Dr	1958	82	1964	D	Lg	Sb,E	.....	.....	Wh.
34daa	..do...	66.5	15	B	1963	51.09	6-29-64	S	Lg	Sb,E	.....	.....	Wh.
156-97													
3bcc	G. C. Kaldahl	162	4	Dr	1962	82	1964	D	Gv	Sb,E	.....	.....	
3cdd	Emil Foss	45	16	B	.....	40	1964	D	Sd	J,E	.....	.....	Wh.
3ddb	Anderson Est.	125	4	Dr	.....	.....	.....	N	Gv	Cy	.....	.....	
4bcbl	J. A. Hickel	95	4	Dr	1931	85	1964	S	..	Cy,E	.....	.....	Wh, Lpc.
4bcb2	..do...	195	4	Dr	1951	145	1964	D,S	..	Sb,E	.....	.....	Wh.
5bdd	Carlyle Wheeler	187	.....	Dr	.....	157	1962	D	Lg	E	.....	.....	C.
7cdd	Francis Schnieder	140	4	Dr	.....	138	1964	N	..	Cy	.....	.....	Wh.
9adc	Alice Donnelly	91.0	24	B	.....	76.55	7-7-64	O	Sd	N	.....	.....	Wl.
9caa	City of Ray No. 1	184	8	Dr	1938	144	1958	Ps	..	Tu,E	969	.....	Y 80 gpm, C.
9cdc	City of Ray No. 2	156	10	Dr	1938	123	1950	Ps	..	Tu,E	1,280	.....	Y 60 gpm, C.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
156-97, Cont.													
9dbd1	City of Ray	169	.....	Dr	1952	.....	.....	T	..	N	.....	.....	L.
9dbd2	City of Ray No. 3	160	10	Dr	1953	125	1953	Ps	..	Tu,E	.....	.....	Y 150 gpm, L.
9dcc	City of Ray No. 4	156	10	Dr	1953	115	1953	Ps	..	Tu,E	.....	.....	Y 220 gpm, L.
15aad1	George Weisz	118	.....	Dr	.....	.....	.....	D,S	Gv	Sb,E	.....	.....	Wh.
15aad2	..do...	16	.....	Du	.....	11	1964	S	Gv	Cy,E	.....	.....	
16aaa	Test hole	182	4	Dr	6-65	115.73	6-11-65	O	Gv	N	.....	2,274	Td 200 ft, L.
16abb	..do...	160	4.75	Dr	6-65	.....	.....	...	..	Tu	.....	2,271	L.
18bad1	H. H. Weyrauch	112	.....	Dr	1954	94	1964	D	Sd,Lg	Sb,E	.....	.....	Wh.
18bad2	..do...	50	21	B	1954	12	1964	D	..	Cy,H	.....	.....	Wh, Lpc.
18bda	..do...	40	10	Dr	1920	4	1964	N	..	.....	.....	.....	Ws.
22add	Albert Dahl	75	.....	Dr	.....	.....	.....	D,S	Sd	Cy,E	.....	.....	Wh.
24cda	G. T. Bergstrom	80	4	Dr	1962	50	1964	D	Gv	J,E	2,190	.....	Wh (975 ppm), C.
26bba1	Bennie Foss	150	4	Dr	1961	130	1964	D,S	Sd,Gv	Cy,E	1,080	.....	Wh, C.
26bba2	..do...	130	2	Dr	.....	120	1964	D	..	Cy,E	.....	.....	Wh, T 47°.
27aaa	Test hole	155	3	Dr	7-64	110.63	7-7-64	O	Sd,Gv	N	.....	2,255	Td 178 ft, L, Wl.
27bba	Walace Weyrauch	135	4	Dr	1943	105	1964	D,S	Gv	Sb,E	.....	.....	Wh.
28aaa	John Kjelstad	127	2	Dr	.....	117	1964	D,S	..	Cy,W	.....	.....	Wh.
29bbb	Carl Ingvalson	90	4	Dr	1944	55	1964	D	Lg	Cy,G	.....	.....	Wh.
32ddd	Test hole	116	4.75	Dr	11-64	.....	.....	T	..	.....	.....	2,380	L.
33ddd	..do...	63	4.75	Dr	11-64	.....	.....	T	..	.....	.....	2,320	L.
34cba	Richard Aslakson	122	4	Dr	1963	111	1964	S	Gv	Cy,E	.....	.....	Wh, T 45°.
156-98													
7ccc	Osmond Skogen	65	4	Dr	.....	45	1964	D	Sd	J,E	1,880	.....	Wh, C.
9add	F. B. Daniel	115	4	Dr	1948	95	1964	D,S	Lg	Cy,E	.....	.....	Wh.
9ddd	Test hole	63	4.75	Dr	6-65	.....	.....	T	..	.....	.....	2,336	L.
13bba	V. R. Viall	186	6	Dr	1954	166	1964	D,S	Sd,Lg	Sb,E	.....	.....	Wh.
24dad	H. W. Borkenhagen	100	.....	Dr	1947	70	1964	...	..	.....	.....	.....	Wh (514 ppm).
33aaa	Oliver Hodnefield	28	36	Du	.....	23	1964	S	Lg	Cy,E	.....	.....	Wh, Lpc.
33aca	..do...	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	F < 1 gpm.
33bac	E. M. Larson	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	F < 1 gpm.
33bba	..do...	200	4	Dr	.....	115	1964	D,S	..	Cy,E	.....	.....	Ws, Lpc.
35bda	City of Wheelock	187	4	Dr	1912	174	1964	Ps	..	Cy,E	1,780	.....	Wh, C.
35bdb	Kenneth Thue	217	4	Dr	1958	192	1964	D	..	Cy,E	.....	.....	Wh (1,436 ppm).
35ccd	Test hole	30	4.75	Dr	5-66	.....	.....	T	..	.....	.....	2,360	L.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
156-99													
7bca	Vern Lund	150	4	Dr	1961	.....	.....	S	Sd	Cy,E	.....	.....	
9ccd	Volberg Volden	250	4	Dr	1910	240	1964	D,S	Lg	Cy,E	.....	.....	Ws.
10ccc	Clarence Erickson	226	6	Dr	1910	222	1964	D,S	..	Cy,W	.....	.....	Wh.
10dda	..do...	145	6	Dr	.....	120	1964	D	..	Cy,E	.....	.....	Wh, Wa.
12add	H. F. Leverenz	50	4	Dr	.....	34	1964	D,S	..	E	.....	.....	Wh.
13bbb	Test hole	40	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,223	L.
15adc	J. R. Vandeberg	109	4	Dr	1910	104	1964	S	Sd,Lg	Cy,G	.....	.....	
16bba	Otto Christopherson	260	5	Dr	1961	230	1964	D,S	..	Sb,E	.....	.....	
17ccc	Gust Hiepler	180	6	Dr	.....	.....	.....	D,S	..	Cy,E	.....	.....	Ws, T 48°.
19bcb	J. T. Irgens	145	6	Dr	1962	80	1964	D	..	E	.....	.....	Wh.
20baa	Gilmore Bjella	230	4	Dr	1910	.....	.....	D	..	Cy,E	.....	.....	Ws, Lpc.
22dbb	Henry Haugen	14	36	Du	1935	11	1964	D	Sd	Cy,H	.....	.....	T 42°.
25bbc	M. J. Vandeberg	160	4	Dr	1910	.....	.....	S	Lg	Cy,E	.....	.....	
26aad	J. R. Vandeberg	91	4	Dr	1908	61	1964	D,S	Sd	Cy,E	.....	.....	
27add	Mary Coltvet	111	4	Dr	1910	40	1964	D,S	Cl	Cy,E	.....	.....	Wh.
27dad1	E. B. Johnsrud	111	4	Dr	1910	89.18	6-3-64	S	..	Cy,E	.....	.....	Wh (376 ppm), T 45°.
27dad2	..do...	129	5	Dr	1957	89	1964	D	..	Cy,E	.....	.....	Wh.
28cdd	Rueben Backen	68	4	Dr	1912	43	1964	D	..	J,E	.....	.....	Wh (615 ppm), Wa.
32bcc	Lyle Westphal	119	4	Dr	.....	.....	.....	D	Cl	Cy,E	.....	.....	Wh (362 ppm), T 47°.
32dda	O. G. Thorness	160	4	Dr	1914	.....	.....	D	..	Cy,E	.....	.....	T 47°, Lpc.
156-100													
2ccc	Roy Jackman	110	4	Dr	1962	90	1964	S	Lg	Cy,G	.....	.....	Wh.
2dcd	Vern Lund	200	4	Dr	1961	.....	.....	S	Sd	Cy,G	.....	.....	
7abb	C. J. Daniel	23	1.25	Dv	.....	19	1964	D	Sd	J,E	.....	.....	Wh.
7ccc1	G. D. Keef	20	18	B	1962	11	1964	D	Gv	J,E	.....	.....	Ws.
7ccc2	Test hole 1439	52	4.75	Dr	10-58	.....	.....	T	..	.....	1,960	1,905	L,C.
9baa1	Roy Jackson	20.0	4	Dr	1964	7.98	7-10-64	N	..	.....	.....	.....	Wh.
9baa2	..do...	125	.....	..	.....	50	1964	D	Sd	J,E	.....	.....	Wh.
9ccb	G. Zenk Est.	50	48	Du	1910	30	1964	D	Gv	J,E	.....	.....	
17aab	Test hole 1438	63	4.75	Dr	10-58	.....	.....	T	..	.....	.....	1,925	L.
18aaa	Test hole 14-776	210	4.75	Dr	6-61	.....	.....	T	..	.....	.....	1,918	IM.
18bbb	Test hole	231	1.25	Dr	7-64	F	7-1-64	T	..	.....	.....	1,900	Plugged, L.
19daa	Test hole 13-776	231	4.75	Dr	6-61	.....	.....	T	..	.....	.....	1,940	IM.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
156-100, Cont.													
20bca	H. S. Pankowski	35	66	Du	.....	.....	.....	S	Cl	Cy,E	.....	.....	Wh, Lpc, T 45°.
20bcc1	..do...	85	5	Dr	1963	40	1964	S	..	Cy,E	.....	.....	Wh, T 45°.
20bcc2	..do...	65	5	Dr	.....	25	1964	D	Gv	Sb,E	.....	.....	Wh.
24abc	Earl Korsmo	164	4	Dr	1920	130	1964	D	Lg	Cy,E	.....	.....	Wh (923 ppm).
29aad	Nicoline Arnt	20	36	Du	1950	17	1964	N	Gv	Cn,E	.....	.....	Wh.
30cba1	Ermo Cartier	207	4	Dr	1948	+1.8	7-14-64	S	Gv	.....	.....	.....	F 2 gpm, T 50°.
30cba2	..do...	19	36	Du	1943	9	1964	N	Gv	Cy,H	.....	.....	Wh, Lpc.
31cad	A. & G. Christianson	225	4	Dr	.....	F	1964	N	Gv	.....	.....	.....	F < 1 gpm, T 50°.
32aaa	Test hole 12-776	210	4.75	Dr	6-61	.....	.....	T	..	.....	.....	1,918	LM.
33cdb	Metzger Est.	Spring	.....	..	.....	F	1965	S,Irr	..	.....	.....	.....	F 300 gpm.
33caa	..do...	11	36	Du	.....	7	1964	D	Sd	Cy,H	.....	.....	Wh, Lpc.
33ccc	Test hole 1433	63	4.75	Dr	10-58	.....	.....	T	..	.....	1,620	1,900	L, C.
35dda1	M. R. Smith	225	6	Dr	1918	210	1964	D	Lg	Cy,E	.....	.....	Wh (513 ppm), Lpc.
35daa2	..do...	235	4	Dr	1965	205	1965	D	Sd	Cy,E	1,480	.....	C.
156-101													
2bbb	Test hole 15-776	241	4.75	Dr	6-61	.....	.....	T	..	.....	.....	1,926	LM.
4cdd	Even Johnson	38	7	Dr	1956	F	1964	D,S	Lg	Cy,E	2,020	.....	Ws, F 10 gpm, T 46°, C.
9dab	Calvin Orth	Spring	.....	..	.....	F	1964	D	..	.....	.....	.....	F 32 gpm.
10d	W. H. Clay	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 5 gpm.
11b	..do...	Spring	.....	..	.....	F	1964	N	..	.....	.....	.....	F 20 gpm.
11bcb	..do...	100	6	Dr	.....	.....	.....	N	Lg	Cy,H	.....	.....	Ws.
12ccc	Test hole 1440	52	4.75	Dr	10-58	.....	.....	T	..	.....	.....	1,935	L.
14acd	J. M. Moline	Spring	.....	..	.....	F	1964	S	Lg	.....	.....	.....	F 10 gpm.
14adb	..do...	95	4	Dr	1962	50	1964	D,S	Lg	Cy,E	.....	.....	Ws.
15cbb	M. K. Harstad	265	4	Dr	1963	215	1964	S	Lg	Cy,E	.....	.....	Wh, L.
18bbc	Test hole 30-776	152	4.75	Dr	8-61	.....	.....	T	..	.....	.....	2,050	LM.
19aaa1	E. E. Palmer	18	24	Du	.....	15	1964	D	Sd	Cy,H	.....	.....	Ws.
19aaa2	..do...	38	4	Dr	1951	16	1964	S	Gv	Cy,E	.....	.....	Wh.
19aaa3	..do...	34	4	Dr	1955	14	1964	D	Gv	J,E	.....	.....	Wh.
20ccd	M. B. Nasner	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	Wa, F 2 gpm.
22aaa	M. K. Harstad	265	4	Dr	1959	110	1964	D,S	Sd	Sb,E	.....	.....	Ws.
22bbc	..do...	70	4	Dr	1962	58	1964	S	Gv	Cy,G	.....	.....	Wh.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
156-101, Cont.													
23aaa	J. M. Moline	95	.....	Dr	1962	55	1964	S	Lg	Cy,E	.....	.....	Ws.
23bbc	M. K. Harstad	90	4	Dr	1962	3	1964	S	Lg	Cy,E	.....	.....	Wh.
24cbb	Edwin Johnson	85	4	Dr	1949	45	1964	D,S	Gv	Cy,E	.....	.....	Wh.
25aac	Ermo Cartier	81	5	Dr	1948	26	1964	D	Gv	J,E	.....	.....	
25adb	..do...	77	5	Dr	.....	37	1964	S	Lg	Cy,E	.....	.....	Wh.
26ddd	Laura Moline	60	4	Dr	1959	40	1964	D,S	Sd	E	.....	.....	Wh.
28dbb	Emil Seidel	12	36	Du	1963	8	1964	D,S	Gv	Cy,E	.....	.....	Wh.
29ad	E. F. Nasner	Spring	.....	..	.....	F	1964	S	..	.....	.....	.....	F 1 gpm.
29cdal	..do...	16	48	Du	1904	12	1964	D,S	Lg	Cy,G	.....	.....	Wh, T 44°.
29cda2	..do...	86	24	B	1936	80	1964	N	Lg	Cy	.....	.....	Wh, Lpc.
34cc	August Nasner	Spring	.....	..	.....	F	1964	D,S	..	.....	.....	.....	F 30 gpm, T 46°.
34ccc	..do...	73	24	B	.....	33	1961	N	Cl	Cy,H	.....	.....	
35ba	George Holmes	Spring	.....	..	.....	F	1964	D,S	Lg	.....	.....	.....	F 30 gpm.
35bbb	Test hole 29-776	168	4.75	Dr	8-61	.....	.....	T	..	.....	.....	1,950	IM.
36bcb	Robert Andre	17	1.5	Dv	1954	12	1964	S	Sd	Cn,E	.....	.....	Wh (513 ppm), Wa.
156-102													
8daa	Lawrence Mischke	54	4	Dr	1956	24	1964	S	Gv	Cy,H	3,430	.....	C.
8dac	..do...	127	4	Dr	1963	37	1964	D	Lg	Cy,E	3,030	.....	Wh, T 45°.
9bcb	H. O. Mischke	65	4	Dr	1957	25	1964	D,S	..	Cy,E	.....	.....	Wh.
10bcc	George Halvorson	20	6	Dr	1959	F	1964	D,S	Gv	.....	.....	.....	Wh, T 46°.
13baa	C. B. Collins	12	.....	Du	1944	10	1964	S	Sd	Cy,H	.....	.....	Wh, Np.
14adal	Harold Berger	180	4	Dr	1961	40	1964	D,S	Lg	Cy,E	.....	.....	Ws.
14ada2	..do...	20	36	Du	.....	17	1964	D	Gv	E	.....	.....	Wh.
17aad1	Mike Barkie	18	36	Du	.....	8	1964	N	Cl	Bu,H	.....	.....	C.
17aad2	..do...	78	4	Dr	1952	26	1964	S	Lg	Cy,E	.....	.....	Wa.
17aad3	..do...	67	4	Dr	.....	33	1964	D	..	Cy,E	.....	.....	Np.
20baa	E. M. Slaamot	125	24	Dr	1920	116	1964	S	Lg	Cy,E	.....	.....	Wh, Wa.
20dad	A. Owen	98	4	Dr	.....	70	1964	S	..	Cy,E	.....	.....	
25ccd	A. M. Higley	24	4	Dr	.....	.....	.....	D	Gv	Cy,E	.....	.....	
32baa	O. I. Harstad	203	4	Dr	1964	70	1964	D,S	..	Cy	.....	.....	
35aaa	Thomas Layons	160	5	Dr	1925	.....	.....	S	..	Cy,E	.....	.....	Np, Lpc.
156-103													
3add	Marvin Chammess	185	4	Dr	1959	155	1964	D,S	Sd	Cy,E	.....	.....	Wh.
3cdd	J. P. Yedstie	150	6	Dr	1918	85	1964	D,S	Lg	Cy,E	.....	.....	Wh.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
156-103, Cont.													
5bbb	A. L. Running	180	.....	Dr	1909	.....	.....	D,S	..	Cy,E	.....	.....	Wh.
5daa	Carl Sanda	70	1.25	Dr	.....	.....	.....	D	..	Cy,E	.....	.....	Wh.
6ddd	A. M. Augedahl	130	4	Dr	1911	120	1964	D,S	Sd	Cy,E	.....	.....	Wh.
7bdd	Lloyd Bakkum	230	4	Dr	1962	.....	.....	D	..	Cy,E	.....	.....	Wh.
8cdd	Vern Trogstad	160	24	Du	1926	142	1964	D,S	..	Cy,E	.....	.....	Wh.
9bbb	Test hole	60	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,409	L.
11bbd	M. G. Hanson	80	6	Dr	.....	40	1964	D,S	Lg	Cy,E	.....	.....	Wh.
12ccb	Sam Allick	10	.....	Du	1964	5	1964	D	..	H	.....	.....	Ws.
12ccc	..do...	80	.....	..	1924	30	1964	N	..	Cy,H	.....	.....	Wh.
15ddal	A. W. Sutton	34	24	..	1925	22	1964	S	..	E	.....	.....	Wh.
15dda2	..do...	90	4	Dr	1962	18	1964	N	..	.....	.....	.....	C.
15ddb	..do...	14	24	Du	1933	9	1964	D	Sd	Cy	.....	.....	Wh.
16ccc	Test hole	40	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,381	L.
17baa	Nels Trogstad	150	4	Dr	1916	.....	.....	D,S	Sd	Cy,W	.....	.....	Wh, T 47°.
24bba	Wilbur Kalil	60	18	..	.....	59	1964	S	Lg	Cy,G	.....	.....	Wh.
27dcc1	M. Austrein	70	.....	Dr	1944	40	1964	N	..	.....	.....	.....	Wh.
27dcc2	..do...	40	24	..	1959	35	1964	D	..	.....	.....	.....	
31aab1	Charles Miller	180	6	Dr	1950	150.60	5-25-66	D,S	..	Cy,E	1,250	.....	Wh, T 46°, C.
31aab2	..do...	130	6	Dr	.....	.....	.....	D	..	Cy,W	.....	.....	Wh.
32add	Test hole	40	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,372	L.
156-104													
3add	Raymond Sveet	60	.....	Dr	1962	.....	.....	D,S	..	J,E	.....	.....	Wh.
12add	Ivan Sundet	84	1.25	..	.....	40	1964	D,S	..	Cy,E	.....	.....	Wh.
26ddd	Samuel Horab	140	6	Dr	1946	120	1964	D,S	..	Cy,E	.....	.....	Wh.
157-95													
1bcb	Arnold Ives	70	4	Dr	1952	55	1964	D,S	Lg	J,E	.....	.....	TS.
3ddc	Test hole 752	30	5	Dr	6-53	.....	.....	T	..	.....	.....	2,394	TS.
3ddd	Test hole 756	40	5	Dr	6-53	.....	.....	T	..	.....	.....	2,400	TS.
7ddb	J. A. Simon	157	6	Dr	1915	92	1963	D,S	Sd	Cy,E	.....	.....	
10abb	Test hole 755	40	5	Dr	6-53	.....	.....	T	..	.....	.....	2,381	TS.
10ccc	John Swanesund	36	24	B	1943	30	1963	D,S	Sd	Cy,W	.....	.....	Wh, TS.
10ddc	Test hole 750	50	5	Dr	6-53	.....	.....	T	..	.....	.....	2,353	TS.
11bab	Test hole 753	30	5	Dr	6-53	.....	.....	T	..	.....	.....	2,403	TS.
11bba	Test hole 754	40	5	Dr	6-53	.....	.....	T	..	.....	.....	2,404	TS.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
157-95, Cont.													
11bbb	Test hole 727	90	5	Dr	5-53	34.58	5-21-53	...	T	.....	.....	2,404	TS.
11ccc	Test hole 726	80	5	Dr	5-53	12.37	5-21-53	...	T	.....	.....	2,331	TS.
11cdd	Rudolph Weflin	90	4	Dr	6-58	.....	.....	D	Lg	.....	.....	.....	Y 5 to 6 gpm, L.
12bc	Amerada Petr. Corp.	8,312-8,350	.....	Dr	1956	.....	.....	OT	Lm	.....	.....	.....	C.
14bba	Test hole 751	80	5	Dr	6-53	.....	.....	T	..	.....	.....	2,364	TS.
14ccd	Lawrence Pederson	112	4	Dr	1960	.....	.....	...	Lg	Cy,E	.....	.....	Wh.
14cdc	Test hole 749	60	5	Dr	6-53	.....	.....	T	..	.....	.....	2,325	TS.
15add	Peter Braaten	32	6	B	1923	20.35	6-10-53	D	Gv	Cy,H	.....	.....	Wh.
15ddd	Test hole 725	90	5	Dr	5-53	5.12	5-22-53	T	..	.....	.....	2,293	TS.
17cad	Francis Ostlund	32	24	B	1947	20	1964	D,S	Sd	Cy,E	.....	.....	Wh.
19ccc	Test hole 741	90	5	Dr	6-53	.....	.....	T	..	.....	.....	2,304	TS.
21a	Tioga Country Club	134	.....	Dr	5-65	.....	.....	D	Sd	Sb,E	.....	.....	Y 4 to 5 gpm, L.
22aab	Test hole 767	70	5	Dr	7-53	.....	.....	T	..	.....	.....	2,291	TS.
22aba	Test hole 748	60	5	Dr	6-53	.....	.....	T	..	.....	.....	.....	TS.
22ccc	Test hole 738	80	5	Dr	5-53	.....	.....	T	..	.....	.....	2,282	TS.
22ccd	Test hole 761	90	5	Dr	7-53	.....	.....	T	..	.....	.....	2,278	TS.
22cdd	Test hole 760	90	5	Dr	7-53	.....	.....	T	..	.....	.....	2,282	TS.
22daa	Test hole 747	75	5	Dr	6-53	.....	.....	T	..	.....	.....	2,254	TS.
22dad	Test hole 769	60	5	Dr	7-53	.....	.....	T	..	.....	.....	2,258	TS.
22dda	Test hole 770	70	5	Dr	7-53	.....	.....	T	..	.....	.....	2,252	TS.
22ddd	Test hole 724	100	5	Dr	5-53	33.78	5-21-53	T	..	.....	.....	2,249	TS.
23bbb	Test hole 757	60	5	Dr	7-53	.....	.....	T	..	.....	.....	2,316	TS.
23ccc	Ray Lund	75	6	Dr	1945	40	1963	D,S	Gv	J,E	.....	.....	Wh.
24cdd	Esther Knoshaug	80	6	Dr	1955	.....	.....	D	..	Cy,E	.....	.....	Ws.
25bbb	Test hole 743	100	5	Dr	6-53	.....	.....	T	..	.....	.....	2,255	TS.
26abb1	Test hole 763	80	5	Dr	7-53	.....	.....	T	..	.....	.....	2,274	TS.
26abb2	Signal Gas & Oil Co.	195	.....	Dr	.....	.....	.....	T	..	.....	.....	2,252	L.
26abc1	..do...	255	.....	Dr	.....	.....	.....	T	..	.....	.....	2,251	L.
26abc2	..do...	255	.....	Dr	.....	.....	.....	T	..	.....	.....	2,253	L.
26acb1	..do... Well 6	166	6	Dr	.....	52	4-66	Ind	Sd	Sb,E	.....	2,238	
26acb2	..do... Well 5	179	20-6	Dr	.....	61	4-66	Ind	Sd	Sb,E	.....	2,244	
26acb3	..do...	255	.....	Dr	.....	.....	.....	T	..	.....	.....	2,243	L.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
157-95, Cont.													
26acb4	Signal Gas & Oil Co.	205	.....	Dr	.....	.....	.....	T	..	.....	.....	2,234	L.
26accl	..do... Well 1	109	6	Dr	.....	54	4-66	Ind	Sd	Sb,E	.....	2,215	
26acc2	..do... Well 2	162	6	Dr	.....	44	4-66	Ind	Sd	Sb,E	.....	2,230	
26acc3	..do...	205	.....	Dr	.....	.....	.....	T	..	.....	.....	2,234	L.
26bab	Test hole 762	70	5	Dr	7-53	.....	.....	T	..	.....	.....	2,258	TS.
26bcc	Test hole 764	90	5	Dr	7-53	.....	.....	T	..	.....	.....	2,245	TS.
27aab	Test hole 758	60	5	Dr	7-53	.....	.....	T	..	.....	.....	2,249	TS.
27abb	Test hole 759	70	5	Dr	7-53	.....	.....	T	..	.....	.....	2,273	TS.
27acdl	City of Tioga	145	.....	Dr	1952	.....	.....	T	..	.....	.....	.....	L.
27acd2	..do... Well 1	54	9	Dr	1952	.....	.....	PS	Gv	T,E	.....	.....	Wh (395 ppm).
27ada	..do... Well 9	68	12-8	Dr	1960	34	9-60	PS	Sd,Gv	Sb,E	.....	.....	Td 151 ft, L.
27add	..do... Well 2	90	10	Dr	1953	44	5-53	PS	Sd,Gv	Sb,E	.....	.....	Td 165 ft, L.
27bdd	..do... Well 3	110	12-8	Dr	.....	.....	.....	PS	Sd,Gv	Sb,E	.....	.....	Td 140 ft, L.
27dbd	..do... Well 4	116	12-8	Dr	1954	47	8-54	PS	Sd,Gv	T,E	1,730	.....	Td 150 ft, L, C.
27dcb	..do... Well 8	120	12-8	Dr	1960	60	8-60	PS	Sd	Sb,E	2,070	.....	Td 122 ft, L, C.
27ddb	..do... Well 5	93	12-8	Dr	1956	35	1956	PS	Gv	Sb,E	.....	.....	Td 126 ft, L.
27ddc	..do... Well 6	100	12-8	Dr	1957	41	1957	PS	Gv	Sb,E	.....	.....	L, C.
28aad	Ed Fredricson	178	5	Dr	1920	70.45	6-9-53	D	Lg	Cy	.....	.....	Wh.
28bbb	Test hole 739	90	5	Dr	1953	.....	.....	T	..	.....	.....	2,284	TS.
30aaa	Test hole 740	120	5	Dr	1953	.....	.....	T	..	.....	.....	2,293	TS.
30bba	Estella Schmidt	191	4	Dr	1944	96	1953	D,S	Sd	Sb,E	.....	.....	Wh.
32bab	Ruth Stone	75	4	Dr	1947	41	1953	S	Sd	Cy,E	.....	.....	
33aaa	C. R. Cole	122	5	Dr	.....	71	1953	D	Lg	Cy,E	.....	.....	Wh (513 ppm).
34baa	City of Tioga Well 7	96	8	Dr	1958	55	1958	PS	Gv,Sd	Sb,E	.....	.....	C.
35bbb	Test hole 731	60	5	Dr	1953	.....	.....	T	..	.....	.....	2,248	TS.
157-96													
2cdd	R. E. Delaney	20	48	Du	1940	.....	.....	D	Cl	Cy,E	.....	.....	
4dba	Frank Murray	32	48	Du	1905	.....	.....	D	Sd	J,E	.....	.....	Lpc.
5add	Lester McFarlin	85	24	B	1909	.....	.....	D	Cl	Cy,W	.....	.....	Wh, Lpc.
11cdc	S. J. Joyce	34.0	24	B	1910	4.0	9-2-63	O	..	Cy,H	.....	.....	Wl.
17aaa	R. F. Tong	110	5	Dr	.....	.....	.....	D,S	..	Cy,E	.....	.....	Wh.
18bba	Vernon Barman	180	6	Dr	1958	80	1958	D,S	Sd	Sb,E	2,310	.....	Wh, C.
19baa	Test hole	240	4.75	Dr	5-65	.....	.....	T	..	.....	.....	2,320	L.
26aaa	Test hole 742	100	5	Dr	1953	.....	.....	T	..	.....	.....	2,326	TS.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
157-96, Cont.													
26ccc	Melvin Grargaard	115	4	Dr	1965	73.39	7-14-65	D	Sd	Sb,E	4,110	.....	C.
27aab	Carl Meyer	12	60	Du	1915	6.0	9-2-63	D,S	Gv	Cy,E	.....	.....	Wh.
27da	..do...	50	12	B	1960	.....	.....	S	Sd	Cy,G	.....	.....	
28cdc	E. J. Meyer	200	4	Dr	1959	185	1959	S	Sd	Sb,E	.....	.....	
29ccc	..do...	71.1	16	B	1914	33.15	6-13-38	...	Sd	.....	.....	.....	
31ccc	Dorvan Solberg	147	5	Dr	1928	.....	.....	D,S	Gv	P,E	.....	.....	Wh.
157-97													
1ccc	E. V. Qualley	178	4	Dr	1955	.....	.....	D	Sd	P,E	.....	.....	
3bbb	Test hole	199	1.25	Dr	6-65	96.34	6-11-65	O	Gv	N	2,750	2,264	Td 220 ft, L, Wl, C.
3ddd	..do...	178	1.25	Dr	6-65	96.83	6-11-65	O	Gv	N	.....	2,263	Td 200 ft, L, Wl.
5dbc	Ed McMaster	48	18	B	1903	28	1963	D	..	Cy,E	.....	.....	Wh, Lpc.
6aaa	Test hole	220	4.75	Dr	5-66	.....	.....	T	..	.....	.....	2,220	L.
8dac	Carl Flaten	160	2	Dr	.....	.....	.....	S	Lg	Cy,E	.....	.....	Wh, Np.
10ccc	Floyd Henning	166	4.5	Dr	1919	.....	.....	S	Sd	Cy,E	2,490	.....	Wh, C.
12ccd	L. V. Lemire	250	4	Dr	1960	.....	.....	D,S	Sd	Cy,E	.....	.....	Wh (870 ppm).
13ccc	Test hole	315	4.75	Dr	5-66	.....	.....	T	..	.....	.....	2,320	L.
14ccc	..do...	220	1.25	Dr	6-65	142.81	6-10-65	O	Sd	N	2,580	2,308	Td 240 ft, L, Wl, C.
17add	John Thompson	100	2	Dr	1915	.....	.....	D,S	Lg	Cy,E	.....	.....	Wh.
21aaa	Test hole	220	4.75	Dr	5-66	.....	.....	T	..	.....	.....	2,312	L.
22cbc	Johnson Bros.	149	4	Dr	1931	.....	.....	D,S	Sd	Cy,E	.....	.....	Wh.
25dcd	A. L. Anderson	200	6	Dr	.....	.....	.....	D,S	..	Sb,E	.....	.....	Wh.
26dda	Lloyd Pederson	217	4	Dr	1962	.....	.....	S	Sd	Cy,E	.....	.....	Wh.
30add	C. M. Hodenfield	170	2	Dr	1910	.....	.....	D,S	Lg	Cy,E	.....	.....	Ws.
35bcc	A. V. Rinehart	190	4	Dr	1912	.....	.....	D	Sd	Cy,G	.....	.....	Lpc.
36ccc	Test hole	220	1.25	Dr	12-64	118.84	1-22-65	O	Gv	N	.....	2,303	Td 252 ft, L, Wl.
157-98													
3bbb	Chris Anderson	128	4	Dr	1916	90	1961	D,S	Lg	Cy,E	.....	.....	Ws.
4baa	Perry Boline	142	4	Dr	1961	.....	.....	S	Sd	Cy,E	.....	.....	
5aad	..do...	140	4	Dr	1915	.....	.....	S	Lg	Cy,W	.....	.....	Ws.
5bbb	C. H. Jorgenson	165	4	Dr	1963	95	1963	D	..	Cy,E	.....	.....	
10aab	Otto Langager	165	2	Dr	1912	.....	.....	D,S	Lg	Cy,E	.....	.....	Ws.
14bbb	C. D. Larson	150	6	Dr	1955	.....	.....	N	..	Cy	.....	.....	Wh.
14ddd	Elmer Halseth	70	6	Dr	1960	30	1960	S	Gv	Cy,E	.....	.....	Wh.
15cbc1	C. D. Larson	204	4	Dr	1917	130	1963	N	Gv	Cy	.....	.....	Wh.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
157-98, Cont.													
15cbc2	C. D. Larson	145	4	Dr	1951	129	1965	D,S	Sd	Cy,E	1,070	.....	C.
19aaa	G. N. Jorgenson	90	4	Dr	1942	50	1963	D,S	Lg	Cy,E	.....	.....	Wh.
20cdc	Gustaf Mortenson	60	6	Dr	1929	48	1959	D,S	Sd	Cy,H	.....	.....	Wh.
21cac	Karen Larson	50	4	Dr	1926	42	1963	N	Lg	Cy,E	.....	.....	
22cbb	Otto Langager	63	4	Dr	1963	45	1963	S	Lg	Cy,E	.....	.....	
29ccd	Lester Lawdermilk	30	4	Dr	1948	1	1963	D	Sd	Cy,H	.....	.....	
29daa	..do...	42.5	24	B	.....	19.25	6-17-59	N	..	Cy,H	.....	.....	
33aad	I. G. Amundson	115	.....	Dr	1950	.....	.....	D	..	Cy,E	.....	.....	Wh (342 ppm).
34dd	Wallace Hill	80	4	Dr	.....	68	1963	D,S	..	J,E	.....	.....	
35cdd	Almer Barstad	160	4	Dr	.....	150	1963	D,S	..	C,E	.....	.....	Wh.
157-99													
6cbb	Alvin Westerso	200	5	Dr	1917	.....	.....	N	Sd	Cy,E	.....	.....	Wh, Wa.
11b	Nels Anderson	108	4	B	.....	.....	.....	N	Lg	Cy,N	.....	.....	Np.
18cba	Emil Anderson	120	4	Dr	.....	.....	.....	D	Lg	Cy,H	.....	.....	Wh, Lpc.
19bcc	Osmund Vallevik	150	4	Dr	1961	70	1961	D,S	Lg	J,E	.....	.....	Wh.
19dcd	Test hole 17-776	126	4.75	Dr	6-61	.....	.....	T	..	.....	.....	2,066	L.
21bbb	Charles Fay	145	3.75	Dr	1930	111	1963	D,S	Lg	Cy,E	2,160	.....	Wh, C.
27ccd	Addie Bartels	27	24	B	1913	.....	.....	D,S	Gv	Cy,E	.....	.....	Wh.
34bcc	Test hole	158	4.75	Dr	6-65	21.5	10-8-65	T	..	.....	.....	2,045	L.
157-100													
3aba	Hartvig Thorstad	130	4	Dr	1941	100	1941	D	..	Cy,E	.....	.....	Wh (752 ppm).
5ddd	Test hole	294	4.75	Dr	6-65	.....	.....	T	..	.....	.....	1,930	L.
7dad	L. P. Berg	175	5	Dr	1962	.....	.....	D,S	Lg	Sb,E	.....	.....	Ws.
9aac	Test hole 35-776	241	4.75	Dr	8-61	.....	.....	...	..	.....	.....	1,935	LM.
12add	Vern Lund	350	4	Dr	1960	.....	.....	D,S	Sd	Cy,E	.....	.....	Ws.
13bca	C. R. Larson	170	5	Dr	.....	.....	.....	D,S	Gv	Cy,E	.....	.....	Wh.
14dac	A. C. Coonley	159.0	4	Dr	.....	155.0	8-6-63	N	..	.....	.....	.....	
15ab	Pauline Dullum	40	4	Dr	1958	30	1958	S	Lg	Cy,W	.....	.....	Ws.
15bdd	Test hole 19-776	116	4.75	Dr	7-61	.....	.....	T	..	.....	.....	1,940	LM.
15dcc	Acey Fay	20	.....	Du	.....	.....	.....	D	Sd	E	.....	.....	Wh.
17dcd	G. C. Hamann	14	.....	Du	.....	.....	.....	D	St	E	.....	.....	Wh (787 ppm), Np, Lpc.
21aba	Donald Dullum	60	4	Dr	1947	.....	.....	S	Gv	Cy,E	.....	.....	Wh.
22ccc	Test hole 16-776	315	4.75	Dr	6-61	.....	.....	T	..	.....	.....	1,943	LM.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
157-100, Cont.													
28acd	Omar Njos	60	.....	Dr	1962	.....	.....	D	Sd	E	.....	.....	Wh.
30dcc	Edwin Sylte	190	4	Dr	1925	.....	.....	N	Lg	Cy,E	.....	.....	
33cad	Test hole 18-776	231	4.75	Dr	7-61	.....	.....	T	..	.....	.....	1,907	IM.
157-101													
4caa	Raymond Wolverton	76	4	Dr	.....	55	1963	S	Lg	Cy,E	.....	.....	Np.
8bbc	Glen Brevik	50	4	Dr	1960	28	1960	D,S	Lg	J,E	.....	.....	Wh, C.
16aad	Williams Co. Park Bd.	85	4	Dr	1963	40	1963	PS	Lg	Cy,H	.....	.....	
17bcb	Jack Breezley	31.0	36	Du	.....	21.0	8-5-63	N	..	Cy,H	.....	.....	
20ccb	Raymond Berg	120	24	B	1940	90	1963	D,S	Lg	Cy,E	.....	.....	Wh (376 ppm), Lpc.
23add	Test hole	80	4.75	Dr	5-66	.....	.....	T	..	.....	.....	1,980	L.
30ccd	Reuben Hegge	165.0	5	Dr	.....	117.0	8-5-63	N	..	.....	.....	.....	
157-102													
1aad	D. M. Hought	104	4	Dr	1946	.....	.....	D,S	Lg	J,E	.....	.....	Wh (598 ppm).
2ccb	H. W. Groth	148	6	Dr	.....	.....	.....	D	Gv	Cy,E	.....	.....	Wh.
3ccc	Mike Pasternak	145	4.5	Dr	.....	.....	.....	N	St	Cy,W	.....	.....	Lpc.
4abc	Bernard Andre	160	5	Dr	.....	.....	.....	D,S	Cl	Cy,E	.....	.....	Wh, Lpc.
9adc	Rustad Farm	145	6	Dr	1943	.....	.....	D,S	Gv	Cy,W	.....	.....	
13dcd	Lester Schmidt	144	6	Dr	.....	110	1963	D,S	Sd	J,E	.....	.....	Wh (376 ppm).
14ccd	J. G. Hegge	180	4	Dr	.....	150	1963	D	..	Cy,E	.....	.....	Wh (477 ppm).
17aaa	O. J. Anderson	48	5	Dr	.....	20	1963	D,S	Gv	Cy,E	.....	.....	Lpc.
25add	M. A. Anderson	180	4.5	Dr	1922	160	1963	N	Lg	Cy	.....	.....	Wh, Lpc.
30abb	W. R. Hinsverk	65	24	B	.....	15	1963	S	..	Cy,E	.....	.....	Lpc.
32aaa	R. D. Berg	136	4	Dr	1957	120	1963	D,S	Lg	J,E	.....	.....	Wh (1,625 ppm).
157-103													
2aaa	Test hole	40	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,090	L.
3cbb	J. M. Swanson	48	36	Du	.....	12	1963	S	..	J,E	.....	.....	Wh, Lpc.
3dad	Martin Haug	123	8	Dr	1946	.....	.....	S	..	Cy,W	.....	.....	Wa.
5add	Sanda Est.	100	18	B	1930	82	1965	D,S	Sd	Cy,E	2,700	.....	T 46°.
12ddc	Rustad Farm	72	4	Dr	.....	28	1963	D,S	Gv	Cy,E	1,170	.....	Wh, Lpc, C.
13ddc	S. A. Storseth	50	12	B	.....	47	1963	D,S	Gv	J,E	.....	.....	Wh (830 ppm).
23aad	Test hole	160	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,462	L.
23bdb	Archie Strand	93	4	Dr	1912	15	1963	D,S	Lg	Cy,E	.....	.....	Wh, Lpc.
24dcd	Orlando Arnson	24	24	Du	1942	10	1963	N	Lg	Cy	.....	.....	Wa, Lpc.
26daa	Test hole	120	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,420	L.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
157-103, Cont.													
26dcd	O. L Folstad	140	5	Dr	.....	.....	.....	S	Sd,Lg	Cy,E	.....	.....	Np.
29bbc	Andrew Sveet	116	5	Dr	1952	.....	.....	D	Sd	E	.....	.....	Lpc.
29cda	Peter Sveet	45	12	B	1941	30.0	7-26-63	N	Lg	.....	.....	.....	Np.
34bab	H. S. Grimstvedt	240	5	Dr	.....	.....	.....	D,S	Sd	Cy,H	.....	.....	Ws.
35dab	Jack Sever	24	36	Du	.....	8	1963	D	..	Cy,G	.....	.....	Ws, Lpc.
158-95													
6add	D. G. McGinnity	185	4	Dr	1955	.....	.....	D	Gv	Cy,E	.....	.....	
8cbb	H. N. Hoseth	30	24	B	1946	25	1963	D	Gv	J,E	.....	.....	Wh, Lpc.
12add	Orville Eraas	150	4	Dr	1953	.....	.....	S	Lg	Cy,E	.....	.....	
26bbb	Test hole 730	105	5	Dr	5-53	.....	.....	T	..	.....	.....	2,432	L.
33bcd1	E. E. Haakenson	200	4	Dr	.....	.....	.....	S	Lg	Cy,E	.....	.....	Np.
33bcd2	..do...	18	18	Du	.....	12.4	6-1-53	D	Gv	Cy,H	.....	.....	Wh.
34aaa	Test hole 729	80	5	Dr	5-53	14.98	5-22-53	T	..	.....	.....	2,450	TS.
35ccc	Test hole 728	120	5	Dr	5-53	22.28	5-21-53	T	..	.....	.....	2,430	TS.
35dd	Amerada Petr. Co.	5,241	20-7	Dr	4-61	870	1965	PM	Ss	Tu,G	.....	2,434	T 140°.
158-96													
2cdd	Test hole 1643	136	4.75	Dr	11-59	.....	.....	T	..	.....	.....	2,285	L.
3dad	Marvin Overdorf	65	24	B	1910	10	1962	D,S	Lg	Cy,E	.....	.....	Wh (1,710 ppm).
5acc	A. M. Johnson	119	4	Dr	1956	.....	.....	S	Lg	Cy,E	.....	.....	Ws (85 ppm).
6ddc	Albert Dahl	63.0	.....	Du	.....	19.5	9-4-63	S	..	Cy,H	.....	.....	Wh.
9ccc	Marshal Simpson	90	24	B	.....	69	1958	S	Cl	Cy,E	.....	.....	Wh, Np, Lpc.
10ddd	John Sundhagen	85	24	B	1910	50	1963	S	Lg	Cy,E	.....	.....	
11abb	R. L. Sagaser	126	4	Dr	1963	50	1963	...	..	.....	.....	.....	Y 9 gpm, C.
11caa	Alfred Sundhagen	119	6	Dr	1953	50	1963	S	Sd	Cy,E	.....	.....	Wh.
12bbb	Clinton Torgerson	175	4	Dr	1957	8	1957	D,S	Lg	Cy,E	.....	.....	Ws.
14cdd	Test hole 1635	136	4.75	Dr	11-59	.....	.....	T	..	.....	.....	2,295	L.
15add	Ingman Iverson	22	24	B	1960	16	1963	D,S	Sd	Cy,E	.....	.....	Wh.
18dcd	Thor Rosenvald	32	24	B	1936	15	1963	D	Gv	Cy,E	.....	.....	
22bda	Erling Olson	192	6	Dr	1944	.....	.....	D,S	Lg	Cy,E	.....	.....	
23baa	Test hole 1634	126	4.75	Dr	10-59	.....	.....	T	..	.....	.....	2,295	L.
25dcb1	Henry Bohlman	40	18	B	1949	30	1963	D	Sd	Cy,E	.....	.....	
25dcb2	..do...	63	4	Dr	1964	42	1965	D	Sd	J,E	2,910	.....	C.
33ccc	James Simpson	160	5	Dr	1941	125	1961	S	Lg	Cy,E	.....	.....	Wh, Np.
35ddd	W. E. Benson	217	6	Dr	1922	170	1963	N	Sd,Lg	Cy,G	.....	.....	Ws, C.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
158-97													
2aab	Anna Magnuson	68	24	B	1916	.....	.....	D,S	Sd	Cy,E	.....	.....	Lpc.
3ddd	Raymond Frantzich	53	6	Dr	.....	.....	.....	D,S	Sd	Cy,E	.....	.....	Lpc.
5bbb	H. G. Becker	39.0	.....	..	.....	25.0	8-29-63	N	..	.....	.....	.....	
8ddc	M. N. Oase	150	6	Dr	1918	125	1963	S	Sd	Cy,W	.....	.....	Wh, Np, Lpc.
12aba	Arnold Bauste	70	24	B	1929	.....	.....	D,S	Sd	Cy,E	.....	.....	Wh.
13ccd	T. A. Brekke	128	6	Dr	1920	70	1960	D	Sd	Cy,E	.....	.....	Wh (752 ppm), Lpc.
17dab	Julia Grimson	108	18	B	.....	75	1963	D	..	Cy,E	.....	.....	Wh (2,000 ppm).
19aaa	Test hole	178	1.25	Dr	6-65	76.59	7-14-65	O	Sd	.....	3,175	2,235	Td 200 ft, L, Wl, C.
19aab	Einar Stundal	185	4.5	Dr	1957	76	1963	D	Gv	E	.....	.....	Wh, Np, Lpc.
20aac	Erling Stundahl	140	4	Dr	1912	100	1963	N	Lg	Cy,H	.....	.....	Wh, Np.
21aaa	P. M. Larson	50	18	B	.....	20	1963	....	..	Cy,E	.....	.....	
22dcd	Test hole	190	4.75	Dr	5-66	.....	.....	T	..	.....	.....	2,269	L.
26bbb	Carl Brekke	45	24	B	1943	.....	.....	N	Sd	Cy,E	.....	.....	Wh, Lpc.
28aaa	Test hole	220	4.75	Dr	5-66	.....	.....	T	..	.....	.....	2,260	L.
28bdc	Arne Raad	35	24	B	1914	20	1963	D	Lg	Cy,H	.....	.....	
33bbb	Test hole	198	1.25	Dr	6-65	70.16	7-14-65	O	Sd	.....	2,240	2,235	Td 220 ft, L, Wl, C.
35ddd	Carl Perdue	65	6	Dr	.....	20	1963	S	Lg	Cy,E	.....	.....	
158-98													
1aad	Raymond Jacobson	100	4	Dr	1961	84	1963	D	Lg	Cy,E	.....	.....	Wh.
2aad	Lars Marsaa	194	4	Dr	1914	100	1963	....	Lg	Cy	.....	.....	Wh.
4ccc	Test hole	138	1.25	Dr	6-65	65.10	7-13-65	O	Sd	.....	.....	2,182	Td 160 ft, L, Wl.
4dad	Clarence Soholt	90	6	Dr	.....	50	1963	S	..	Cy,E	.....	.....	Np.
7ddd	Test hole	280	1.25	Dr	6-65	121.14	7-13-65	O	Gv	.....	2,800	2,226	Td 304 ft, L, Wl, C.
9dad	Test hole 1520	178	4.75	Dr	5-59	.....	.....	T	..	.....	.....	2,182	L.
10cca	D. V. Soholt	40	4	Dr	1920	30	1963	S	Lg	Cy,H	.....	.....	Np, Lpc.
11bab	Everett Johnson	130	24	B	.....	80	1962	....	..	Cy	.....	.....	
12bbb	Lars Marsaa	33.0	24	B	.....	26.0	8-24-63	....	..	Cy,H	.....	.....	
13aaa	Gilbert Flaten	120	16	B	1914	50	1963	....	..	Cy	.....	.....	Wh.
13ccb	Test hole	218	1.25	Dr	6-65	57.85	7-14-65	O	..	.....	.....	2,208	Td 260 ft, L, Wl.
15dad1	Andrew Ring	160	4	Dr	1952	40	1963	D,S	..	J,E	.....	.....	Wh.
15dad2	..do...	138	2	Dr	1937	60	1959	S	Sd	Cy,W	.....	.....	Wh.
15dad3	..do...	15	36	Du	1920	13	1959	D	Sd	Cy,H	.....	.....	
21aaa	Test hole 1519	189	4.75	Dr	5-59	.....	.....	T	..	.....	.....	2,203	L.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
158-98, Cont.													
21dac	Lyle Skaare	175	4	Dr	1916	125	1963	S	Sd	Cy,E	.....	.....	Wh.
24bcc	P. H. Binde	155	5	Dr	1914	60	1963	N	..	Cy,H	.....	.....	Wh.
25ccc	Herman Leite	70	24	B	1943	30	1961	D	Sd	Cy,W	.....	.....	
25ddc	W. & A. G. Hill	68	6	Dr	.....	.....	.....	D,S	..	Cy,E	.....	.....	Wh.
26dcc	C. R. Anderson	70	24	B	.....	.....	.....	D,S	..	Cy,W	.....	.....	Lpc.
158-99													
2bcc	C. W. Stordalen	150	4	Dr	1916	.....	.....	S	Lg	Cy,E	.....	.....	Wh.
4cbc	J. A. Hillestad	140	6	Dr	1945	.....	.....	S	..	Cy,E	.....	.....	Wa.
5bbb	Test hole	189	4.75	Dr	6-65	.....	.....	T	..	.....	.....	2,069	L.
5ccc	Olaf Evenson	87	4	Dr	1962	80	1963	D,S	Sd	Cy,E	.....	.....	Wh.
7ccc	Edgar Hylland	118	4.5	Dr	1956	90	1963	D,S	Sd	Cy,E	.....	.....	Wh, Np.
7ddd	Test hole	100	1.25	Dr	6-65	75.80	7-13-65	O	Sd	.....	2,500	2,089	Td 200 ft, L, Wl, C.
11bab	Truman Opperud	146	.....	Dr	1956	.....	.....	N	..	.....	.....	.....	Wh, Np.
12dcc	Christ Soiseth	150	5-2	Dr	1917	130	1963	D,S	Sd	Cy,E	2,370	.....	Wh, C.
13ddd	Test hole	258	1.25	Dr	6-65	145.95	7-13-65	O	Gv	.....	1,900	.....	Td 294 ft, L, Wl, C.
14bcb	A. T. Kvande	96	6	Dr	1961	70	1963	D	Sd	Cy,E	.....	.....	Wh.
14ddc	Sidney Larson	165	4	Dr	.....	150	1963	S	Lg	Cy,E	.....	.....	Wh.
15aaa1	Test hole	180	1.25	Dr	6-65	50.63	7-13-65	O	Gv	.....	2,770	2,119	Td 210 ft, L, Wl, C.
15aaa2	..do...	130	1.25	Dr	9-65	49.55	10-7-65	O	Sd	.....	2,140	2,118	Td 160 ft, L, Wl, C.
15bcd	E. L. Bibler	83	.....	Dr	1953	8	1963	D,S	..	E	.....	.....	Wh.
16cdd	Floyd Hogeland	85	4	Dr	1955	80	1965	S	Sd	.....	2,110	.....	Wh, C.
18ccc	J. B. Skaare	180	4	Dr	.....	120	1963	D	Sd	E	.....	.....	Wh.
20cdc	Arthur Opsal	150	3	Dr	.....	.....	.....	D	Sd	P,E	.....	.....	Wh.
22cbc	John Opsal	140	3.75	Dr	1907	.....	.....	S	Lg	Cy,E	.....	.....	Wh.
23ccd	Gordon Hendrickson	172	2	Dr	1916	.....	.....	S	Sd	Cy,E	.....	.....	Wh, Lpc.
26cdc	A. W. Helstad	180	6	Dr	1951	142.0	8-14-63	N	Sd	.....	.....	.....	
27ada	Gunnar Kvande	165	4	Dr	1962	150	1962	S	..	Cy,E	.....	.....	
28add	Berger Helstad	180	5	Dr	.....	.....	.....	D	..	Cy,W	.....	.....	Wh.
31bdd	J. J. Erstad	186	5	Dr	1911	.....	.....	D	Sd	Cy,G	.....	.....	Wh.
158-100													
4bcb	L. B. Solberg	65	4	Dr	1959	20	1963	D	Sd	Cy,E	.....	.....	
4ccc	Harvey Solberg	65	6	Dr	1919	20	1959	D,S	Sd	Cy,W	.....	.....	Ws.
5aaa	Test hole 1515	105	4.75	Dr	5-59	.....	.....	T	..	.....	.....	.....	L.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
158-100													
6abb1	Test hole 22-776	326	4.75	Dr	7-61	.....	.....	T	..	.....	.....	2,000	IM.
6abb2	V. C. Anderson	38	.....	B,Dv	1943	30	1963	D	Gv	J,E	.....	.....	
6ddd	Test hole	80	3	Dr	6-64	+.37	7-9-64	O	Sd	.....	1,190	1,970	Td 336 ft, L, Wl, C.
7bdb	Test hole 25-776	63	4.75	Dr	7-61	.....	.....	T	..	.....	.....	1,980	L.
7dcd	Freeman Est.	52	6	Dr	1936	F	1963	D,S	Sd	.....	.....	.....	
8daa1	Test hole	160	1.25	Dr	5-66	21.97	6-21-66	O	Sd	.....	2,160	1,998	Td 189 ft, L, C.
8daa2	Test hole	80	4	Dr	5-66	25.95	6-21-66	O	Gv	.....	2,340	1,998	Td 94 ft, L, C.
9ccb	Gordon Axness	78	4	Dr	1950	28	1963	D	Sd	J,E	.....	.....	Wh, Np.
11ccc	Test hole	210	4.75	Dr	6-65	.....	.....	T	..	.....	.....	2,082	L.
13cdd	John Krabseth	146	2	Dr	1911	.....	.....	N	Sd	Cy,E	.....	.....	Wh.
14cdc	Hilda Johnson	160	4	Dr	1962	148	1963	D,S	Sd	Cy,E	.....	.....	Wh, Wa.
17abb	Norman Helgeson	110	1.25	Dr	5-66	16.72	7-5-66	O	Sd,Gv	.....	2,250	1,983	Td 136 ft, L, C.
17abc1	..do...	67	1.25	Dr	4-66	26.95	7-5-66	O	Gv	.....	2,630	.....	Td 84 ft, L, C.
17abc2	..do...	80	1.25	Dr	5-66	.....	.....	T	Sd,Gv	.....	2,700	.....	Td 94 ft, L, C.
17abc3	..do...	90	1.25	Dr	5-66	27.65	7-5-66	O	Sd,Gv	.....	.....	.....	Td 105 ft, L.
17abc4	..do...	92	14	Dr	7-66	24.77	7-5-66	Irr	Sd	.....	2,550	.....	C.
17abc5	..do...	....	4	Dr	7-66	23.35	7-5-66	O	Sd	.....	.....	.....	
17abd	..do...	70	1.25	Dr	5-66	24.25	7-5-66	O	Gv	.....	.....	1,993	Td 73 ft, L.
17acb	..do...	60	1.25	Dr	5-66	24.82	7-5-66	O	Sd,Gv	.....	.....	1,988	Td 70 ft, L.
17ada	..do...	45	1.25	Dr	5-66	19.44	7-5-66	O	Sd	.....	1,970	1,987	Td 52 ft, L, C.
17caa	Test hole 21-776	94	4.75	Dr	7-61	.....	.....	T	..	.....	.....	1,980	IM.
19ccc	Test hole 1442	84	4.75	Dr	11-58	.....	.....	T	..	.....	1,730	.....	L, C.
20aab	Lawrence Smith	96	4	Dr	1962	76	1966	D	Sd	Sb,E	1,880	.....	C.
21ddc	Herbert Eidsvoog	165	3.5	Dr	1945	95	1963	D,S	Sd	Cy,E	.....	.....	Wh.
26aaa	Test hole	130	1.25	Dr	6-65	117.85	7-13-65	O	Sd	.....	.....	2,137	Td 157 ft, L, Wl.
26aca	Lester Quie	287	4	Dr	1944	180	1963	D	..	Cy,E	.....	.....	Wh (376 ppm).
29bdb	Minnie Anderson	12.1	24	B	.....	5.52	6-18-59	N	..	Cy,W	.....	.....	
30ddd	Test hole 20-776	315	4.75	Dr	7-61	.....	.....	T	..	.....	.....	1,935	IM.
31acb	Lloyd Berg	14	.....	Dr	1959	.....	.....	D	Gv	E	.....	.....	
33abb	Henry Gafkjen	160	4	Dr	1942	.....	.....	D,S	Sd	Cy,E	.....	.....	Wh.
34bdc	T. C. Walstad	130	5	Dr	1915	70	1963	D,S	Sd	Cy,E	.....	.....	Wh.
35bb	Selmer Gafkjen	162	4	Dr	1918	.....	.....	D,S	Sd	Cy,E	.....	.....	Wh.
35dac	Clifford Ryen	350	2	Dr	1923	.....	.....	D,S	Sd	Cy,E	.....	.....	

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
158-101													
2bcb	Henry Grev	116	4	Dr	1957	16	1957	D,S	Ss	J,E	1,970	.....	Ws (85 ppm), C.
2bcc	..do...	74.6	24	B	.....	38.75	8-16-48	D,S	..	Cy,W	.....	2,041	Ws.
4ada	Severt Kingstad	130	6	Dr	1957	70	1963	D,S	..	J,E	.....	.....	Ws.
4bda	L. J. Ingwall	180	6	Dr	.....	156	1948	D,S	..	Cy,W	.....	.....	Ws.
5bbb1	O. A. Rustad	190	6	Dr	.....	145	1948	N	..	.....	.....	2,195	
5bbb2	..do...	90	6	Dr	.....	82	1948	D,S	Ss	Cy,W	.....	.....	
8bbb	R. S. Moorehead	66.0	24	B	.....	52.0	8-3-63	S	Sd	Cy,E	.....	.....	Wh, Lpc.
10aac	G. A. Magnus	50	6	Dv	.....	.....	.....	D	Lg	Cy,E	.....	.....	
11add	Bourrett & Sons	48	24	B	.....	.....	.....	D,S	Gv	Cy,E	.....	.....	
22abb	Wilber Werner	365	3	Dr	1921	165	1963	D	Sd	Cy,E	.....	.....	
23aaa	Bourrett & Sons	16	36	Du	.....	14	1963	N	Sd	Cy	.....	.....	Wh.
23ddd	Mabel Amsbaugh	60	4	B	.....	40	1959	D,S	Sd	Cy	.....	.....	
24dcc	Test hole 1441	63	4.75	Dr	.....	.....	.....	T	..	.....	.....	.....	L.
28dad	J. B. Poeckes	96	24	B	.....	30	1960	D	Lg	Cy,W	.....	.....	
158-102													
4aaa	Howard Ross	165	6	Dr	1950	.....	.....	D	..	E	.....	.....	Wh (427 ppm).
5bcb	Carl Knutson	15	36	Du	.....	11	7-29-63	D,S	Sd,Gv	Cy,E	.....	.....	Lpc.
8baa	Arne Krogen	90	24	B	1929	.....	.....	S	Lg	Cy,E	.....	.....	Wh, Np, Lpc.
8cdd	Reynold Oster	120	24	B	1959	100	1963	D,S	Gv	J,E	.....	.....	Wh, Lpc.
9bbc	George Haugen	313	3	Dr	1949	240	1963	D,S	Sd	Cy,E	.....	.....	Ws.
9ddd	Emma Haugen	30	48	Du	.....	25	1963	D,S	Sd	J,E	.....	.....	Lpc.
13aaa	Robert Moorehead	160	5	Dr	.....	.....	.....	D,S	Lg	Cy,W	.....	.....	Wh.
17dda	Leo Seven	30	24	B	1930	14	1963	D,S	Gv	Sb,E	.....	.....	Wh, C.
18cbd	Gilmer Thome	150	4	Dr	1958	.....	.....	D,S	Lg	Cy,E	.....	.....	Lpc.
20bbd	L. J. Rassier	200	4	Dr	1953	50	1963	S	..	Cy,E	.....	.....	Np.
23daa	Alphonse Muller	59	24	B	1942	45	1963	D,S	Sd	Cy,E	.....	.....	Wh (770 ppm), Lpc.
24dcc	Phillip Rassier	80	6	Dr	1958	60	1958	D	Gv,Sd	J,E	.....	.....	
28aab	O. J. Anderson	80	24	B	.....	60	1963	D	..	J,E	.....	.....	Lpc.
28aba	..do...	240	6	Dr	1960	200	1963	Irr	..	Cy,E	2,930	.....	Pumps 5 gpm, T 48°, C.
28bbc	Nick Andre	41.0	16	B	.....	6.0	7-30-63	N	..	Cy,H	.....	.....	
29bbd	Harry Handte	180	5	Dr	1958	150	1963	S	Gv	E	.....	.....	
30adc	Norbert Kueffler	110	3	Dr	1944	58	1963	S	Lg	Cy,E	1,470	.....	C.
31cdc	E. C. Vig	120	6	Dr	1915	.....	.....	...	Lg	Cy,W	.....	.....	Wh, Lpc.
32ddd	Pasternak Est.	160	6	Dr	.....	.....	.....	D,S	..	E	.....	.....	Wh, Lpc.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
158-103													
1cbc	Test hole	25	1.25	Dr	9-65	6.27	10-8-65	O	Gv	.....	1,230	2,100	Td 80 ft, L, Wl, C.
7aad	Milo Langberg	35	24	B	1916	4	1963	D,S	Sd	J,E	.....	.....	Wh (615 ppm), Lpc.
11bbc	Emmer Falvag	330	4	Dr	1956	.....	.....	S	Sd	Cy,E	.....	.....	Wa, Lpc.
12ac	D. J. Thome	40	24	B	1961	32	1963	S	Lg	Cy,W	.....	.....	
13bbb	Lawrence Clementson	104	18	B	.....	50	1963	D,S	Lg	J,E	.....	.....	Wh (325 ppm).
14aaa	Test hole	80	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,245	L.
18daa	A. T. Muller	65	24	B	1944	55	1963	D	Gv	E	.....	.....	
19ddd	Aloys Muller	90	24	B	.....	.....	.....	D,S	Lg	Sb,E	.....	.....	Wh, Lpc.
20aaa	Albert Muller	40	.....	Dr	1957	F	1963	N	Lg	.....	.....	.....	F 2 gpm, T 47°.
20bcc	Albert Seven	138	5	Dr	1916	116	1963	D,S	Lg	J,E	.....	.....	Wh (308 ppm), Lpc.
24bdb	Alvin Andre	50	6	Dr	1953	.....	.....	D,S	Sd	J,E	.....	.....	Wh.
25bbc	Test hole	80	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,205	L.
33cdc	Maurice Swanson	60	6	Dr	1947	.....	.....	S	Gv	Cy,E	.....	.....	Lpc.
159-95													
1ddb	John Goedert	153	6	Dr	1915	100	1963	S	Sd	Cy,E	.....	.....	Wh.
10ccc	Helge Holte	30	36	Du	1916	27	1963	D,S	Sd	Cy,E	.....	.....	Wh, Lpc.
11cdc	R. O. Hanson	129	.....	Dr	.....	.....	.....	S	..	Cy,E	.....	.....	Wh, Wa.
14cca	Simon Berg Co.	16	48	Du	1921	13	1965	D	Gv	Cn,E	1,400	.....	T 48°, C.
14dbb	Donald Barden	22	36-1.5	Du-Dv	.....	16	1963	D	Sd	Cy,E	.....	.....	
14dbc	Test hole 1640	127	4.75	Dr	11-59	.....	.....	T	..	.....	.....	2,230	L.
14dcc	Test hole 1637	25	5	Dr	11-59	4	1959	N	Gv	N	2,050	.....	C.
15aad	Test hole 1641	200	4.75	Dr	11-59	.....	.....	T	..	.....	.....	2,260	L.
15ccc	Test hole	240	4.75	Dr	8-65	.....	.....	T	..	.....	.....	2,300	L.
15dda	Test hole 1642	31	5	Dr	11-59	4	1959	T	Gv	N	1,510	.....	C.
19aab	Test hole	220	4.75	Dr	8-65	.....	.....	T	..	.....	.....	2,320	L.
22aaa	Test hole 1636	157	4.75	Dr	11-59	.....	.....	T	..	.....	.....	2,220	L.
22dcc	Reuben Tande	320	4-2	Dr	1959	40	1959	N	Sd	Cy,E	.....	.....	Wh, Lpc.
23dad	Test hole 1638	42	4.75	Dr	11-59	.....	.....	T	..	.....	2,930	2,220	L, C.
24aba	Test hole 1647	105	4.75	Dr	12-59	.....	.....	T	..	.....	.....	2,210	L.
24bbc	Mary Roloff	24	6	Dr	.....	16	1963	D,S	Sd	J,E,Cy,W	.....	.....	Wh.
26cbb	A. K. Strid	325	.....	Dr	.....	100	1963	D	Lg	.....	.....	.....	L, C.
30ddd	E. F. McGinnity	215	6	Dr	.....	.....	.....	S	Lg	Cy,E	.....	.....	Lpc.
31bdd	Westberg Farms	25	7	Dr	1953	15	1963	D	..	J,E	.....	.....	Wh, Lpc.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
159-96													
1add	L. P. Nelson	80	6	Dr	1950	.....	.....	S	..	Cy,E	.....	.....	Wh, C.
2bad	E. Asluckson	20	.....	Du	.....	.....	.....	D,S	..	Cy,H	.....	.....	Wh, Lpc.
3ddd	George Peterson	320	4.5	Dr	1952	80	1965	S	Sd	Cy,E	5,280	.....	C.
13ccb	H. & H. Olson	130	18-6	B-Dr	1930	30	1963	S	Lg	Cy,E	.....	.....	
14cdd	A. A. Suendsaye	230	.....	Dr	1956	.....	.....	Ds	Lg	Cy,E	.....	.....	Ws.
18abc	Martin Lien	200	4	Dr	1913	.....	.....	S	Lg	Cy,E	.....	.....	Wh, Lpc.
18dab	Rebecca Halvorson	30	.....	Du	.....	.....	.....	N	..	Cy,H	.....	.....	
20ccc	Test hole	180	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,300	L.
21add	Ole Strand	250	4	Dr	1916	.....	.....	S	Lg	Cy,E	.....	.....	Wh, Np.
22ccc	Test hole	200	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,300	L.
23baa	Test hole	170	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,280	L.
23cca	E. G. Langdalen	17	36	Du	.....	.....	.....	D	Sd	.....	.....	.....	Lpc.
25bba	Albert Bronson	15	48	Du	.....	6.0	9-5-63	D	Sd	Cy,H	.....	.....	Wh, Lpc.
27cbb	A. C. Farland	18	24	B	1952	.....	.....	N	Sd	Cy,H	.....	.....	Lpc.
29bbb	Maynard Halvorson	66	24	B	1938	40	1962	S	Sd,Lg	Cy,E	.....	.....	Wh (1,685 ppm).
31ccc	Lester Smith	40	30	B	.....	15	1963	S	..	Cy,E	.....	.....	Wh, Np.
34bbb	Test hole 1645	147	4.75	Dr	11-59	.....	.....	T	..	.....	.....	2,300	L.
34ccc	Test hole 1644	115	4.75	Dr	11-59	.....	.....	T	..	.....	.....	2,320	L.
159-97													
2baa	City of Wildrose	119	12	Dr	1952	60	1962	Ps	Gv	Tu,E	1,340	.....	T 48°, L, C.
3ccc	Test hole	115	4.75	Dr	10-63	.....	.....	T	..	.....	.....	2,270	L.
3dda	Ovedia Murphy	200	4	Dr	.....	.....	.....	S	..	Cy,E	.....	.....	Ws, Wa.
5bab	Malcolm Lysaker	170	3	Dr	1948	.....	.....	S	Sd	Cy,E	.....	.....	Np.
7aaa	Lawrence Sundsrud	24	24	B	1961	.....	.....	S	..	Cy,E	.....	.....	Wh.
9aab	Jonas Kuilhaug	58	4	Dr	1953	.....	.....	D	Sd	Cy,E	.....	.....	Wh, Lpc.
10ada	Laritz Sevre	170	6	Dr	.....	.....	.....	S	Lg	Cy,E	.....	.....	Wa, Np.
14ccd	S. J. Styve	40	6	Dr	1953	35	1963	D	Sd	E	.....	.....	
17adc	Leland Anderson	30	12	B	.....	.....	.....	D	..	J,E	.....	.....	Wh, Lpc.
18aad	John Holland	55	4	Dr	1963	35	1963	D	Sd	Sb,E	.....	.....	Lpc, L.
21ccd	Arne Ring	35	24	B	.....	.....	.....	D,S	Sd	Cy,W	.....	.....	Wh.
21dad	A. M. Johnson	60	24	B	.....	.....	.....	S	..	Cy,E	.....	.....	Wh.
24cdb	O. C. Nelson	33.0	24	B	.....	20.0	8-29-63	N	..	Cy,H	.....	.....	
26aaa	Test hole	100	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,350	L.
26cdc	Bertha Christopherson	50	30	B	1961	.....	.....	S	Lg	Cy,E	.....	.....	Wh.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
159-97, Cont.													
28aaa	Test hole	60	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,350	L.
30aaa	..do...	60	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,290	L.
32ccd	Elsworth Jacobson	52	4	Dr	1953	40	1963	D,S	Gv	Cy,E	.....	.....	Wh.
35ccc	L. M. Evanson	54	.....	Du	1913	50	1963	D	Sd	Cy,E	.....	.....	Wh (187 ppm).
36aab	Clifford Christopherson	40	4	Dr	1958	27	1958	N	Lg	Cy,E	.....	.....	Wh, Wa, Lpc.
159-98													
1add	E. A. Nelson	214	4	Dr	1950	160	1963	S	Lg	Cy,E	.....	.....	Wh (170 ppm), Wa, Np.
1cdd	F. J. Mikkelson	306	6	Dr	1962	150	1963	D,S	Sd	Sb,E	.....	.....	
1dcc	..do...	50	36-24	B	.....	25	1948	D,S	Sd	Cy,H	.....	.....	
2ccc	C. T. Solen	130	4	Dr	1918	117	1962	D,S	Sd	Sb,E	.....	.....	Wh (255 ppm).
3dcc	Lawrence Lerbakken	250	4	Dr	1962	.....	.....	S	Lg	Sb,E	.....	.....	Wh, Wa, Np.
4aa	C. J. Vicha	234	5	Dr	.....	194	1948	D,S	Sd	Cy,W	.....	.....	
5ddd	Joseph Lerbakken	210	3	Dr	1942	180	1963	S	Lg	Cy,E	.....	.....	Wh, Np.
6bbd	O. C. Viig	247	4	Dr	1928	163	1948	D,S	Lg	Cy,E	.....	.....	Wh.
6cca	Edna Marsaa	131	3	Dr	.....	124	1962	S	Sd	Cy,W	.....	.....	Wh.
8aaa	Clara Digerness	28	22	B	1962	15	1963	D,S	Gv	Cy,E	.....	.....	Ws.
9add	Otto Lerbakken	200	4	Dr	1949	160	1948	N	Lg	Cy	.....	.....	Wh.
10aad	Test hole	216	1.25	Dr	9-65	156.50	10-7-65	O	Gv	.....	3,840	2,230	Td 260 ft, L, Wl, C.
10aca	Village of Corinth	200	4	Dr	.....	130	1948	N	..	Cy,H	.....	.....	
10acd	Melvin Wisdahl	135	4	Dr	1958	90	1963	D	Sd	Sb,E	890	.....	C.
12dcd	K. J. Sundsrud	250	2	Dr	.....	100	1948	S	Lg	Cy,W	.....	.....	Wa.
13aa	..do...	346	2	Dr	.....	100	1948	S	Lg	Cy,W	.....	.....	Wa.
19bdd	Lucy Halvorson	400	5	Dr	1959	170	1963	S	Lg	Sb,E	.....	.....	Ws.
20cbb	Test hole	73	1.25	Dr	9-65	52.92	10-7-65	O	Gv	N	.....	2,170	Td 120 ft, L, Wl.
21ddd	..do...	120	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,340	L.
23aba	J. O. Hanson	15	36	Du	1920	.....	.....	D,S	..	Cy,E	.....	.....	Lpc.
26aaa	Test hole	40	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,360	L.
26abd	Martin Hegseth	60	24	B	1915	52	1963	D,S	Sd	Cy,E	.....	.....	Wh.
27aaa	Ness Farm	60	24	B	.....	.....	.....	D,S	Sd	Cy,W	.....	.....	Lpc.
33add	Anne Thunberg	185	3	Dr	.....	.....	.....	S	..	Cy	.....	.....	Wh.
35dcc	P. S. Aaberg	196	4	Dr	1916	70	1963	D,S	Sd	Cy,E	.....	.....	Np.
159-99													
2baa	Emil Forsberg	228	6	Dr	.....	178	1948	D,S	Lg	Cy,W	.....	.....	Ws.
4add	A. E. Forsberg	180.0	4	Dr	1930	165.0	8-10-63	N	Gv	.....	.....	2,180	Np.
4dda	..do...	80	4	Dr	1960	.....	.....	D,S	Sd	Cy,E	.....	.....	

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
159-99, Cont.													
9dbc	M. O. Otteson	165	6	Dr	.....	40	1948	D,S	..	Cy,W	.....	.....	
10bcc	J. F. Dahl	80	6	Dr	.....	57	1948	D,S	Sd	Cy,W	.....	.....	
11dca	Ervin Lohse	133.5	6	Dr	.....	130.80	8-19-48	N	..	.....	.....	.....	
13bcb	..do...	86	4	Dr	1949	81	1963	D	Lg	Cy,E	.....	.....	Wh (120 ppm), Lpc, L.
14adal	..do...	50	48	Du	.....	46	1948	S	..	Cy,W	.....	.....	Np.
14ada2	..do...	196	5	Dr	.....	106	1948	D	Sd	E	.....	.....	Ws.
14ccd	Emil Bilquist	52	4	Dr	1950	.....	.....	D	..	Cy,E	.....	.....	
19add	Clara Kemmer	180	5	Dr	.....	.....	.....	S	..	Cy,E	.....	.....	Wh, Lpc.
21adc	P. E. Peterson	108	4	Dr	1919	98	1959	S	Sd	Cy,W	.....	.....	
21dab	Ray Anderson	140	4	Dr	1946	110	1963	D	Lg	P,E	877	.....	C.
22cbb	Alamo Farmers Coop	128	4	Dr	1958	88	1965	D	Sd	Cy,E	1,270	.....	C.
22ccb	Test hole	95	4.75	Dr	10-63	.....	.....	T	..	.....	.....	2,110	L.
24ccb	..do...	74	4.75	Dr	6-65	.....	.....	T	..	.....	.....	2,150	L.
26daa	Ervin Lohse	170	4	Dr	1959	80	1963	S	Gv	Cy,G	.....	.....	
29aaa	Test hole 1518	115	4.75	Dr	5-59	.....	.....	T	..	.....	.....	.....	L.
30ddd	Test hole	63	4.75	Dr	6-65	.....	.....	T	..	.....	.....	2,180	L.
31abc	Alma Tuedt	118	3	Dr	1945	90	1963	S	Sd	Cy,E	.....	.....	Wh.
159-100													
1abd	W. C. Holm	50	4	Dr	1959	.....	.....	D,S	Gv	J,E	.....	.....	
1cbb	Test hole	330	4.75	Dr	5-66	.....	.....	T	..	.....	.....	2,030	L.
2add	Oliver Holm, Jr.	370	4	Dr	1955	F	1963	N	Sd	.....	.....	.....	Wh.
3cbc	Henry Knudsulg	19	5	Dr	1948	19	1959	D,S	Gv	Cy,E	.....	.....	
5aaa	Test hole 1522	168	4.75	Dr	5-59	.....	.....	T	..	.....	.....	2,000	L.
6aac	Albert Jorstad	58.7	5	Dr	.....	51.1	7-28-63	N	..	.....	.....	.....	
10bbb	Test hole	200	4.75	Dr	6-64	.....	.....	T	..	.....	.....	2,040	L.
13ccc	Arnold Berve	82	5	Dr	1933	62	1948	N	Sd	Cy,E	.....	.....	Wh.
15bbc	Henry Williams	96	5.5	Dr	1923	66	1959	D,S	Gv	E	.....	.....	
15ccc	K. L. Esterby	61	18	B	1912	50	1959	D,S	Gv	E	.....	.....	Wh.
15dcal	Rose Bibler	25	36	Du	.....	15	1948	N	Gv	Cy,H	.....	.....	Wa, Np.
15dca2	..do...	125	6	Dr	.....	26.12	8-18-48	N	Sd	Cy,W	.....	.....	
16bbb	Test hole 1521	94	4.75	Dr	5-59	.....	.....	T	..	.....	.....	2,040	L.
18bbc	N. J. Oyen	45	6	Dv	.....	35	1948	D,S	..	Cy,H	.....	2,030	
21aaa	Albert Knutson	85	4	Dr	1953	55	1963	N	Sd	Cy,E	.....	.....	Wh.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
159-100, Cont.													
21dcd	Reuben Esterby	30	24	B	1944	12	1959	S	Sd	Cy,E	.....	.....	Wa, Np, Lpc.
23aaa	Test hole	378	4.75	Dr	6-65	.....	.....	T	..	.....	.....	2,060	L.
23ada	LeRoy Ramsfield	78	3	Dr	1948	58.24	8-20-48	D,S	Gv	Cy,E	.....	.....	
23caa	W. E. Holm	40	4	Dr	1959	.....	.....	D	Sd	J,E	.....	.....	
24baa	Arnold Berve	162	5	Dr	1916	90	1963	S	Lg	Cy,E	.....	.....	Wh, Wa, Np.
25cbc	Elmer Johnson	80	3	Dr	.....	.....	.....	D,S	Gv	Cy,E	.....	.....	
27acb	Great Northern Railway	30	.....	Du	.....	23	1959	Ps	Gv	Cn,E	855	.....	T 46°, C.
28add	Test hole	100	1.25	Dr	10-63	21.59	11-12-63	O	Gv	.....	2,430	2,000	Td 375 ft, L, Wl, C.
28bbc	Test hole 1516	105	4.75	Dr	5-59	.....	.....	T	..	.....	.....	2,020	L.
28bcc	Mobil Oil Co.	45	6	Dr	1957	35	1959	D	Sd	E	.....	.....	
28dad	William Piske	31	6	Dr	.....	26	1963	D	Gv	P,E	.....	.....	Ws.
29add	Test hole 26-776	379	4.75	Dr	8-61	.....	.....	T	..	.....	.....	1,980	LM.
30abd	Albert Esterby	11	.....	Dv	.....	.....	.....	D	Sd	J,E	.....	.....	
31add	Test hole 34-776	158	4.75	Dr	8-61	.....	.....	T	..	.....	.....	2,010	LM.
32aab	Wilbur Smith	31	4	Dr	1942	20	1959	D	Sd	E	.....	.....	
33daa	Martin Johnson	15.35	B	Dr	.....	10.95	6-16-59	N	Sd	Cy,W	.....	.....	
34bac	..do...	15	.....	Dv	.....	.....	.....	S	Sd	Cy,E	.....	.....	
35ccc	R. W. Dullum	65	5	Dr	.....	60	1963	D,S	Sd	Cy,E	.....	.....	
159-101													
1aac	U. S. Bureau of Reclamation AH-20	44	.....	Dr	12-46	14	1946	T	Cl	.....	.....	2,088	L.
2cca	Clifford Christianson	85	24	B	.....	45	1948	S	Sd	Cy,W	.....	.....	Np.
2ddd	E. M. Olson	25	1	Dv	1955	.....	.....	D	Sd	J,E	.....	.....	
3cdd	Olaf Christianson	90	24	B	.....	F	1963	D,S	Lg	.....	.....	.....	Wh, T 48°.
6ccc	F. H. C. Schultz	58.6	24	B	.....	36.31	8-13-48	D	..	Cy,H	.....	.....	
9cac	Clarence Olson	80	5	Dr	1922	.....	.....	S	Lg	P,E	.....	.....	
10aca1	N. A. Gill	44.0	4	Dr	.....	33.48	8-13-48	N	..	.....	.....	2,100	
10aca2	..do...	64.5	24	B	.....	41.47	8-13-48	S	..	Cy,W	.....	2,100	
10ccc	Merlyn Olson	100	3-2.5	Dr	.....	.....	.....	N	..	Cy,H	.....	.....	Wa.
11aaa	E. M. Olson	12	36	Du	.....	6	1948	D,S	..	Cy,H	.....	2,040	
11dcd	U. S. Bureau of Reclamation AH-17	40	.....	Dr	1946	.....	.....	T	..	.....	.....	2,084	L.
12dad	B. J. Anfinson	100	6	Dr	.....	.....	.....	D,S	..	Cy,E	.....	.....	Wh.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
159-101, Cont.													
13ada	Victor Kittelson	50	4	Dr	.....	.....	.....	D,S	Lg	Cy,E	.....	.....	
14bcd	Rayna Paulson	117.8	4	Dr	.....	115.68	8-13-48	N	..	.....	.....	2,150	
18aad	Knute Nelson	40	24	B	.....	30	1963	S	..	Cy,E	.....	.....	Wa, Np, C.
18bbc	Jewell Rodvold	200	3	Dr	1943	100	1963	D,S	..	E	2,950	.....	Ws, C.
18bcb	U. S. Bureau of Reclamation 10	61	.....	Dr	1946	.....	.....	T	..	.....	.....	2,100	L.
20bda	U. S. Bureau of Reclamation AH 12	23	.....	Dr	1946	.....	.....	T	..	.....	.....	2,067	L.
22aad	Andrew Corneliuson	84	24	B	.....	78	1948	D	Lg	Cy,E	.....	.....	Wh, Np.
22abc	U. S. Bureau of Reclamation AH 15	60	.....	Dr	1946	.....	.....	T	..	.....	.....	2,103	L.
22bbc	U. S. Bureau of Reclamation AH 14	28	.....	Dr	1946	.....	.....	T	..	.....	.....	2,071	L.
25bbc	Adolph Anderson	28	.....	Dv	1960	20	1965	D	Sd	Cy,E	910	.....	C.
26aab	Zahl School	205	4	Dr	1953	100	1965	Ps	..	Sb,E	1,880	.....	C.
26aac	Nels Hanson	67	6	Dr	1950	27	1963	D	Lg	J,E	.....	.....	Lpc, L.
26abc	Test hole	50	1.25	Dr	10-63	17.31	11-12-63	O	Sd	.....	1,623	2,000	Td 215 ft, L, Wl, C.
27baa	Oscar Quarne	95	6	Dr	.....	8	1959	D,S	Gv	Cy,W	.....	.....	Np.
27daa	H. B. Hanson	96.5	24	B	1939	70	1963	S	Sd	Cy,E	.....	.....	Wh, Np, Lpc.
28ccc	Julian Gunlickson	153	4	Dr	1964	90	1964	S	..	Cy,G	.....	.....	
31ccc	Harold Schilke	180	6-4	Dr	.....	120	1961	D,S	..	Cy,E	.....	.....	
32dbb	H. L. Rustad	100	5	Dr	1905	96	1948	D,S	Lg	E	.....	.....	
32dcd	..do...	80	5	Dr	1945	80	1963	D	Sd	Cy,W	.....	.....	Lpc.
33aaa	Z. M. Brannon	180	6	Dr	.....	160	1948	N	Cl	Cy	.....	.....	Ws.
34abc	Joseph Lund	85	24	B	.....	70	1948	N	Lg	Cy,E	.....	.....	Wh.
34dcc	A. K. Bratlien	64	24	B	.....	20	1963	Ds	Sd	J,E	.....	.....	Ws.
159-102													
1bcc	George Eberle	47	36	Du	.....	33	1948	D,S	..	Cy,E	.....	.....	Wh.
7bbb	Jens Lund	200	6	Dr	.....	.....	.....	S	..	Cy,W	.....	2,130	Np.
7dab	U. S. Bureau of Reclamation AH 2	42	.....	Dr	1946	6	1946	T	..	.....	.....	2,088	L.
8cbd	..do... AH 3	54	.....	Dr	1946	14	1946	T	..	.....	.....	2,102	L.
8cda	..do... 4	58	.....	Dr	1946	27	1946	T	..	.....	.....	2,102	L.

(1)	(2)	(4)		(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
159-102, Cont.													
11bad	L. P. Simoneau	42	24	B	1926	30	1963	S	..	Cy,E	.....	.....	Wh, Lpc.
12ccc	U. S. Bureau of Reclamation 9	88	.....	Dr	1946	52	1946	T	..	.....	.....	2,132	L.
13aab	Village of Hanks	65	24	B	.....	58	1948	D	..	Cy,E	.....	.....	Np.
14cba	Andrew Moen	235	4.5	Dr	.....	210	1963	N	Sd	Cy	.....	.....	Wh.
18ddc	E. L. Fischer	151.0	18	B	.....	120.84	8-11-48	S	..	Cy,W	.....	.....	Np.
19cdd	T. E. Kilbride	92	24	B	.....	78	1963	D	..	J,E	.....	.....	
20cba	L. L. Larson	235	4	Dr	1958	.....	.....	S	Gv	Sb,E	.....	.....	Td 239 ft, L.
20ddc	W. M. Larson	35	24	B	.....	19.70	8-11-48	D	..	Cy,H	.....	2,230	
26bba	Elmer Hexem	110	6	Dr	1958	65	1958	S	Lg	Cy,E	2,960	.....	C.
26bbb	..do...	24	48	Du	.....	16	1948	D,S	..	Cy,G	.....	2,260	
29bcb	H. H. Garaas	260	4	Dr	1960	240	1963	D	Sd	Cy,E	.....	.....	Wh, Td 345 ft, L.
30add	O. A. Garaas	37.7	18	B	.....	11.75	8-11-48	D	..	Cy,H	.....	2,240	
30bad	Albert Fischer	59.1	24	B	.....	43.09	8-11-48	S	..	Cy,E	.....	2,240	Np.
33ddd	Howard Ross, Jr.	121	7	B	.....	112	1948	S	Lg	Cy,W	.....	2,260	Np.
35ccb	Clarence Poling	14	36	Du	1950	7.0	7-31-63	D,S	..	J,E	.....	.....	Lpc.
159-103													
3aad	E. P. Jensen	76.5	30	B	.....	47.25	8-10-48	S	..	Cy,W	.....	.....	
6ddd	Test hole	160	1.25	Dr	6-64	24.60	7-9-64	O	Gv	.....	1,630	2,000	Td 346 ft, L, Wl, C.
10aaa1	Owen Jacobson	100	6	Dr	.....	35	1963	S	Sd	Cy,E	.....	.....	Wh.
10aaa2	..do...	16	24	B	1958	12	1959	D,S	..	Cy,E	.....	.....	Lpc.
10bbb	Test hole	250	1.25	Dr	10-63	37.69	11-12-63	O	Gv	.....	1,980	2,050	Td 275 ft, L, Wl, C.
11aba1	O. E. Arnold	333	6	Dr	.....	40	1959	S	..	Cy,W	.....	.....	Np.
11aba2	..do...	12	36	Du	1924	10	1959	S	Sd	Cy	.....	.....	Wh.
12acc	Test hole	240	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,060	L.
12caa	City of Grenora	26	144	Du	1937	17.99	7-13-65	Ps	Gv	Tu,E	1,040	2,060	C.
12cad	..do...	38	24	B	.....	20	1965	Ps	Gv	Tu,E	890	2,060	C.
12ccc	Test hole	140	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,080	L.
13abb	H. N. Jetson	148	24	B	.....	88	1948	D,S	Sd	Cy,W	.....	2,090	
13cbc	U. S. Bureau of Reclamation 6-P	58	.....	Dr	1946	.....	.....	T	..	.....	.....	2,102	L.
14bab	..do... B	112	.....	Dr	1946	14	1946	T	..	.....	.....	2,037	L.
14cab	Cynthia Angermeier	40	4	Dr	1955	30	1955	D	Gv	J,E	.....	.....	Wh.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
159-103, Cont.													
20add	Clifford Price	130	4	Dr	.....	70	1948	D,S	Sd	Cy,W	.....	.....	
21acb	P. E. Peterson	65	24	B	.....	45	1948	S	Sd	Cy,W	.....	2,050	
23add	Test hole	160	4.75	Dr	1965	.....	.....	T	..	.....	.....	2,160	L.
23ddd	Sanford Tangen	168	6	Dr	.....	148	1948	S	Sd	Cy,G	.....	2,150	Wa, Np.
24cbb	Albert Fischer	190	6	Dr	.....	126	1963	D	Sd	Sb,E	.....	.....	Wh, Np.
24ccb	..do...	52.5	30	B	.....	36.16	8-10-48	S	..	Cy,G	.....	.....	Np.
25ccc	Test hole	140	4.75	Dr	9-65	.....	.....	T	..	.....	.....	2,220	L.
26bac	Roy Angermeier	140	4	Dr	.....	.....	.....	S	Sd	Cy,W	.....	.....	Np.
27ccd1	Lief Lundby	165	4	Dr	1948	.....	.....	D	..	Sb,E	1,570	.....	
27ccd2	..do...	135	24	B	.....	120	1948	S	..	Cy,G	.....	2,140	Wa, Np.
28cab	Bror Lindquist	56	.....	..	.....	47	1963	D	..	E	.....	.....	
29ccd	Clifford Price	300	4.5	Dr	1963	80	1963	D	Sd	Sb,E	.....	.....	Lpc.
30ccc	A. C. McGrath Est.	53	24	B	.....	38	1948	D,S	Sd	Cy,W	.....	2,000	
32abd	V. C. Medhus	114	6	Dr	.....	94	1948	D,S	..	Cy,W	.....	2,070	

TABLE 2.--Logs of wells and test holes

152-103-5bbb

Geologic source	Material	Thickness (feet)	Depth (feet)
Alluvium:			
	Soil, black	1	1
	Sand, poorly sorted, subangular to subrounded	9	10
	Silt, dusky-yellow to light-olive-gray, clayey and sandy, calcareous, laminated	5	15
	Sand, gravelly, poorly sorted, angular to rounded	16	31
	Clay, dusky-yellow to light-olive-gray, silty and sandy	23	54
	Gravel, sandy, poorly sorted, angular to rounded	2	56
	Clay, dusky-yellow to light-olive-gray, silty, calcareous, contains lignite fragments	9	65
	Sand, medium to coarse, with some pebbles, moderately well sorted, angular to rounded	11	76
	Gravel, fine to coarse, and about 50 percent yellowish-brown, silty clay	16	92
	Clay, olive-gray, silty	32	124
Fort Union Group:			
	Clay, light-bluish-gray to light-olive-gray, silty, calcareous	23	147

152-103-7ddd

Alluvium:			
	Soil, black	1	1
	Clay, dark-yellowish-brown, silty, slightly calcareous, oxidized	11	12
	Clay, dark-greenish-gray, (color change from above is gradational), silty	5	17
	Sand, fine, moderately well sorted, angular to rounded	17	34
	Gravel, sandy, poorly sorted, angular to rounded	12	46
	Clay, olive-gray to light-olive-gray, silty and sandy, (probably some interbedded sand lenses); contains lignite	49	95
	Clay, greenish-gray, sandy; contains lignite	49	144
	Gravel, fine to coarse, poorly sorted, angular	12	156
Fort Union Group:			
	Lignite, black	8	164
	Clay, light-olive-gray, silty, calcareous	36	200

152-103-8bbb

Alluvium:			
	Soil, black	1	1
	Clay, dusky-yellow, silty, calcareous, much fine lignite	52	53
	Gravel, sandy, poorly sorted, angular	23	76
	Sand, very fine, or silt (no sample)	7	83
	Gravel, sandy, poorly sorted, maximum size 40 millimeters	16	99
	Sand, fine to coarse, poorly sorted, much lignite	11	110

152-103-8bbb--Continued

Geologic source	Material	Thickness (feet)	Depth (feet)
Alluvium--Continued:			
	Gravel, sandy, poorly sorted, subrounded to rounded, predominant size about 10 millimeters	5	115
	Clay, olive-black, sandy; color due to abundant lignite particles	11	126
	Gravel, sandy, poorly sorted; size ranged from about 0.25 to 12 millimeters, predominant sizes are 1 and 10 millimeters	11	137
	Clay, olive-gray to greenish-gray, sandy and silty, calcareous	11	148
	Sand, fine to coarse, poorly sorted, angular	25	173
	Gravel, fine, much lignite	5	178
Fort Union Group:			
	Clay, light-gray to brownish-gray, sandy and silty	42	220

152-104-1ddd

Alluvium:			
	Soil, black	1	1
	Clay, moderate-olive-brown to light-olive-gray, silty and sandy, calcareous	40	41
	Sand, medium to coarse, moderately well sorted, angular to rounded	20	61
	Sand, gravelly, poorly sorted, angular to rounded	16	77
	Clay, light-olive-gray, silty, bentonitic, calcareous	4	81
	Gravel, moderately well sorted, subangular to subrounded	17	98
Fort Union Group:			
	Clay, light-olive-gray to brown, silty and sandy, (color depends on dispersed lignite in clay)	18	116

152-104-11add

Alluvium:			
	Clay, dusky-yellow to light-olive-gray, silty, calcareous; locally sandy	42	42
	Sand, poorly sorted, angular to rounded, average size is 0.5 millimeter	9	51
	Clay, dusky-yellow to pale-olive, calcareous	3	54
	Gravel, sandy, poorly sorted, angular to rounded; average size is 2.5 millimeters	15	69
Glacial drift:			
	Till, moderate-yellowish-brown, silty, oxidized	9	78
	Till, olive-gray to dark-greenish-gray	12	90
	Gravel, poorly sorted, subangular to rounded; average size is 25 millimeters	17	107
Fort Union Group:			
	Clay, light-gray, silty	29	136

152-104-14bbb

Geologic source	Material	Thickness (feet)	Depth (feet)
Alluvium:			
	Clay, pale-yellowish-brown to moderate-yellowish-brown, silty, calcareous; oxidized; contains fine grains of quartz, dolomite, and lignite	10	10
	Clay, olive-gray to moderate-yellowish-brown, silty, calcareous, oxidized	11	21
	Sand, medium, moderately well sorted, angular to rounded	21	42
	Sand, gravelly, poorly sorted, angular, average size is about 2.5 millimeters	10	52
Glacial drift:			
	Till, moderate-yellowish-brown to olive-gray	32	84
	Sand, gravelly, poorly sorted, angular to rounded; average size is about 2 millimeters-	7	91
Fort Union Group:			
	Clay, light-olive-gray, silty	25	116

153-102-17cca2

Glacial drift:			
	Till(?), dark-yellowish-orange, silty, oxidized-	38	38
	Gravel, poorly sorted, angular; average size is 5 to 10 millimeters	1	39
	Till(?), dark-yellowish-orange, silty, oxidized-	4	43
Fort Union Group:			
	Clay, light-brownish-gray to bluish-gray, silty-	9	52

153-102-17ccc

Alluvium:			
	Soil	1	1
	Silt, dusky-yellow, sandy and clayey, calcareous, oxidized	11	12
	Gravel, poorly sorted, angular, average size is 5 to 10 millimeters	4	16
	Clay, dusky-yellow, silty and sandy, calcareous-	19	35
	Gravel, sandy, poorly sorted, subangular to sub-rounded, oxidized	12	47
Glacial drift:			
	Till, dusky-yellow, silty, oxidized, contains lignite and sand grains	10	57
	Gravel, sandy, poorly sorted, subangular to angular	18	75
Fort Union Group:			
	Clay, light-bluish-gray to light-gray, sandy and silty, laminated	19	94

153-102-17ddc1

Alluvium:			
	Loam, dark-brown, sandy	0.5	0.5
	Silt, light-olive-gray, very sandy, slightly cohesive	4.5	5
	Clay, light-olive-gray, silty, cohesive, moderately plastic	18	23

153-102-17ddc1--Continued

Geologic source	Material	Thickness (feet)	Depth (feet)
Alluvium--Continued:			
	Gravel, sandy, fine to medium, brownish colored; contains thin lenses of clayey silt and clayey sand	6	29
	Gravel, fine to medium, and coarse sand; individual pebbles are brownish and reddish colored; contains considerable "scoria" (baked clay)	13	42
Fort Union Group:			
	Clay, olive-gray, very silty, slightly calcareous, cohesive, plastic, interbedded with light-olive-gray silt and dark-greenish-gray carbonaceous, fine to medium sand	19	61
	Silt and very fine sand(?), micaceous (poor sample, returns suspended in drilling mud)	33	94

153-102-17ddc2

Alluvium:			
	Clay, yellowish-brown, silty	15	15
	Clay, olive-gray, sandy and silty	6	21
	Gravel, fine to coarse, and about 25 percent fine to medium sand	10	31

153-103-6cbb

Glacial drift:			
	Soil, black	1	1
	Till, moderate-yellowish-brown to dusky-yellow, silty, oxidized	11	12
Fort Union Group:			
	Silt, dusky-yellow to grayish-orange, clayey, oxidized	40	52
	Clay, light-bluish-gray, sandy	11	63

153-103-25dad

Glacial drift:			
	Soil, black	1	1
	Till, dusky-yellow to light-olive-gray, silty	4	5
	Sand, gravelly, poorly sorted, subrounded to subangular, oxidized	6	11
	Till, light-olive-gray to dusky-yellow, silty, oxidized	31	42
	Gravel, sandy, poorly sorted, subrounded to angular	7	49
	Till, olive-gray to dark-greenish-gray, silty	2	51
	Gravel, fine to coarse	2	53
	Till, olive-gray to dark-greenish-gray, silty	4	57
	Gravel, sandy, poorly sorted, angular to rounded	17	74
Fort Union Group:			
	Clay, light-bluish-gray, silty and sandy; some thin sandstone	42	116

154-95-4bab

Geologic source	Material	Thickness (feet	Depth
Alluvium:			
	Loam, dark-brown, sandy----------	1	1
	Clay, yellowish-gray to dusky-yellow, silty, oxidized----------	2	3
	Sand, white, medium to very coarse with fine gravel, angular to subrounded; pebbles are predominately limestone----------	7	10
Glacial drift:			
	Till, moderate-olive-brown to light-olive-gray, silty and sandy, partially oxidized----------	9	19
	Till, olive-gray, silty----------	68	87
	Sand, fine to coarse, with gravel and clay lenses; general color is brownish-gray, principally due to iron stained chips of limestone, shale and concretions----------	20	107
Fort Union Group:			
	Sand, dark-greenish-gray, very fine, interbedded with lignite and light-gray clay----------	9	116
	Shale, medium-gray----------	3	119
	Lignite and interbedded, very fine, dark-greenish-gray, sand----------	11	130

154-95-18c
George Hove

(Log furnished by Simpson and Son)

	Topsoil, gumbo----------	1	1
	Clay, yellow----------	41	42
	Clay, sandy, brown----------	25	67
	Sand and coarse gravel----------	1	68
	Sand and gravel, slightly clayey----------	12	80
	Sand and coarse sand----------	6	86
	Clay or shale, gray----------	1	87

154-96-6aaa
Test hole 15-35

Alluvium:			
	Clay, yellow, silty, oxidized----------	20	20
	Clay, yellow, oxidized----------	34	54
	Sand, fine to medium----------	18	72
	Sand, coarse----------	11	83
Glacial drift:			
	Till, gray, contains shale pebbles and medium gravel----------	20	103
	Sand, medium to coarse----------	24	127
	Gravel and sand, coarse----------	19	146
Fort Union Group:			
	Clay, gray, sandy----------	11	157

154-96-7aaa
Test hole 15-37

Alluvium:			
	Clay, brown, silty----------	3	3
	Clay, yellow----------	26	29
	Sand, fine to medium----------	22	51

154-96-7aaa--Continued

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Till, gray to yellowish-gray, contains shale and pebbles	12	63
	Gravel, fine to medium	67	130
Fort Union Group:			
	Clay, gray, sandy	6	136

154-96-8bab

	Soil	3	3
	Clay, dusky-yellow to light-olive-gray, silty	15	18
	Clay, dusky-yellow to light-olive-gray, silty; contains lenses of silt and fine to medium sand	20	38
	Sand, fine to medium, moderately well sorted, subangular to subrounded	7	45
	Sand, medium to very coarse, and fine to medium gravel, moderately well sorted, subangular to subrounded	75	120

154-96-12ccb

Alluvium:			
	Silt, yellowish-gray, and very fine, sand	8	8
	Clay, yellowish-gray, silty, oxidized	4	12
	Silt, yellowish-gray, slightly cohesive, oxidized	4	16
	Gravel, sandy, fine to medium, angular to subrounded	20	36
	Gravel, sandy, fine to coarse, angular to subrounded	13	49
	Sand, gray, clayey	9	58
	Lignite, black, detrital	3	61
Fort Union Group:			
	Shale, medium-gray, black, cohesive	15	76
	Lignite, black, fissile	5	81
	Shale, black, carbonaceous	5	86
	Shale, light-greenish-gray, silty to sandy	22	108
	Lignite, black, fissile	6	114
	Sand, light-greenish-gray, clayey, calcareous, medium-gray and black shale	11	125
	Shale, medium-gray and black with thin lenses of lignite	9	134
	Shale, greenish-gray, sandy	17	151
	Lignite	6	157
	Clay, black, oily	2	159
	Lignite	2	161
	Shale, light-greenish-gray, lignitic	9	170
	Shale, light-greenish-gray	15	185
	Clay, white, calcareous	4	189
	Lignite	2	191
	Shale, olive-gray, sandy	7	198
	Sand, light-greenish-gray, clayey, very fine grained, calcareous	24	222
	Shale, brownish-black, carbonaceous	7	229
	Sand, light-olive-gray, very fine grained	11	240
	Shale, medium-gray; contains a thin limestone lense	17	257
	Shale, light-olive-gray to olive-gray	16	273
	Sand, greenish-gray, very fine; contains thin indurated layers	11	284
	Shale, varigated green, gray, black, silty, lignitic	7	291

154-96-12ccb--Continued

Geologic source	Material	Thickness (feet)	Depth (feet)
Fort Union Group--Continued:			
	Sand, greenish-gray, very fine----------	6	297
	Shale, varigated grays, silty----------	23	320
	Lignite----------	2	322
	Clay, black, oily----------	3	325
	Shale, greenish-gray, sandy, hard----------	10	335
	Shale, gray to black, silty, carbonaceous-------	6	341
Fort Union Group (Cannonball Formation):			
	Sand, dark-greenish-gray, fine, glauconitic, lignitic, subrounded to rounded, loose-------	44	385

154-96-18bbb
Test hole 15-39

Alluvium:			
	Soil, black----------	4	4
	Sand, coarse----------	17	21
	Gravel, fine to medium----------	9	30
	Sand, fine to coarse----------	6	36
	Clay, yellow, sandy----------	18	54
	Clay, greenish-gray, silty----------	10	64
	Gravel, fine to coarse----------	15	79
Fort Union Group:			
	Clay, light-gray, silty----------	5	84

154-97-1aaa
Test hole 15-34

Alluvium:			
	Silt, dark-brown, sandy----------	9	9
	Clay, yellow, silty----------	12	21
	Sand, coarse and fine gravel; contains silt and clay----------	11	32
	Gravel, fine to medium----------	11	43
	Sand, very fine to coarse----------	37	80
Glacial drift:			
	Till, gray----------	34	114
	Gravel, fine to medium----------	13	127
	Gravel, coarse, cobbles----------	9	136

154-97-1ddd
Test hole 15-38

Alluvium:			
	Soil, brown, sandy----------	1	1
	Clay, light-brown, fine sand----------	10	11
	Clay, yellow to buff, silty, oxidized----------	10	21
	Sand, fine, gray, contains intersticial clay----	9	30
	Clay, light-yellow, sandy----------	11	41
	Sand, fine to medium----------	22	63

154-97-10aaa
Test hole 15-41

Alluvium:			
	Soil, dark-brown to black----------	4	4
	Clay, yellow, oxidized----------	7	11
	Clay, yellow and fine to medium gravel, oxidized	10	21
	Clay, brown, fine gravel, oxidized----------	21	42

154-97-10aaa--Continued

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Till, dusky-yellow, oxidized----------	21	63
	Till, gray----------	32	95
Fort Union Group:			
	Clay, light-gray, sandy----------	10	105

154-97-11aaa
Test hole 15-40

Alluvium:			
	Soil, brown----------	3	3
	Clay, yellowish-gray; contains some gravel------	16	19
	Clay, yellowish-gray----------	24	43
	Sand, clayey, fine to coarse----------	9	52
Glacial drift:			
	Till, gray, silty----------	23	75
	Sand, coarse----------	6	81
	Gravel, fine to coarse----------	20	101
Fort Union Group:			
	Clay, light-gray, sandy----------	4	105

154-97-12bbb

Alluvium:			
	Soil, black, sandy----------	2	2
	Clay, yellowish-gray, sandy, oxidized----------	5	7
	Clay, dusky-yellow, calcareous, oxidized; contains interbedded silt and fine sand------	41	48
Glacial drift:			
	Till, light-olive-gray to olive-gray, silty-----	32	80
	Sand, medium, well sorted, subrounded----------	8	88
	Gravel, fine to coarse, moderately well sorted, subangular to subrounded----------	32	120

154-97-14acb
Lund observation well 5

Alluvium:			
	Soil, black, silty, sandy----------	2	2
	Sand, fine to coarse, about 25 percent fine to coarse gravel----------	47	49
	Gravel, fine to coarse----------	9	58
Glacial drift:			
	Till, yellowish-brown, silty; contains coal fragments----------	4	62
	Till, olive-gray, silty; contains coal fragments	24	86
	Sand, fine to coarse; contains much coal--------	9	95
	Gravel, fine to coarse, with some sand----------	50	145
Fort Union Group:			
	Clay, light-gray, sandy, silty----------	2	147

154-97-14acc2
Lund observation well 1

Geologic source	Material	Thickness (feet)	Depth (feet)
Alluvium:			
	Loam, dark-brown, sandy----------	2	2
	Clay, white, sandy, very calcareous----------	1	3
	Sand, medium to very coarse, fine and medium gravel, reddish-brown, sorted in layers, oxidized----------	30	33
	Silt, dusky-yellow, oxidized----------	5	38
	Sand, medium to very coarse, oxidized----------	23	61
Glacial drift:			
	Till, moderate-olive-brown, sandy, partially oxidized----------	2	63
	Till, olive-gray, silty, sandy----------	23	86
	Gravel, fine to very coarse, sand; apparently moderately well sorted in lenses----------	57	143
Fort Union Group:			
	Clay, very light-gray, silty, calcareous, smooth----------	14	157

154-97-14acc3
Lund observation well 4

	Clay, black, silty----------	2	2
	Gravel, sand, unsorted----------	8	10
	Sand, fine to coarse----------	6	16
	Sand, fine to coarse, about 25 percent fine to coarse gravel; contains coal fragments-------	54	70
	Till, yellowish-brown to olive-gray, silty------	18	88
	Sand, fine to coarse----------	6	94
	Gravel, fine to coarse; contains about 25 percent coal fragments and about 25 percent silty clay----------	8	102
	Gravel, fine to coarse with a few rocks---------	8	110
	Gravel, fine to coarse, about 25 percent medium to coarse sand; contains coal fragments------	26	136

154-97-14bdd
Lund observation well 2

Alluvium:			
	Soil, black, silty----------	2	2
	Clay, yellowish-brown, silty----------	1	3
	Gravel, fine to coarse----------	7	10
	Sand, fine to coarse with some gravel----------	42	52
	Sand and gravel, fine to coarse, some clay------	14	66
Glacial drift:			
	Till, olive-gray, silty; contains coal fragments----------	20	86
	Sand, fine to coarse, contains coal particles---	13	99
	Gravel, fine to coarse, about 25 percent medium to coarse sand, contains coal fragments-------	27	126

154-97-14dbb
Lund observation well 3

	Clay, silty----------	2	2
	Gravel, fine to coarse, about 25 percent medium to coarse sand----------	8	10
	Sand, fine to coarse; contains coal fragments---	12	22
	Gravel, fine to coarse, about 25 percent fine to coarse sand----------	20	42

154-97-14dbb--Continued
Lund observation well 3

Geologic source	Material	Thickness (feet)	Depth (feet)
	Sand, fine to coarse with gravel lenses; contains coal fragments	23	65
	Till, olive-gray, silty	25	90
	Sand, fine to medium; contains coal fragments	13	103
	Gravel, fine to coarse, about 25 percent fine to coarse sand; contains many coal fragments	21	124
Fort Union Group:			
	Clay, light-bluish-gray, sandy, silty	12	136

154-101-1ccd
Test hole 24-776

Alluvium:			
	Soil, black	1	1
	Clay, moderate-yellowish-brown, silty, oxidized	3	4
	Gravel, fine to coarse, poorly sorted, subangular to rounded	7	11
	Sand, fine to very coarse, poorly sorted, subangular to rounded	16	27
Glacial drift:			
	Till, olive-gray, silty	23	50
	Sand, very fine to very coarse, poorly sorted, angular to rounded	12	62
	Clay (till?), olive-gray, silty, calcareous (poor samples)	27	89
	Gravel and sand, poorly sorted	4	93
	Sand, very fine to very coarse, poorly sorted, subangular to rounded	7	100
	Clay (till?), olive-gray, silty, calcareous (poor samples)	5	105
	Sand, very fine to coarse, poorly sorted	12	117
	Gravel, sandy, medium gravel to coarse sand; contains abundant resistant brown gravels	18	135
Fort Union Group:			
	Clay, light-grayish-blue, silty	12	147

154-101-2cddl
Test hole 3-776

Glacial drift:			
	Soil, black	1	1
	Gravel, fine to coarse, poorly sorted, subrounded	3	4
	Till, moderate-yellowish-brown, silty, oxidized	27	31
	Till, light-olive-gray, silty	20	51
	Silt, light-olive-gray to greenish-gray, clayey, calcareous; appears to be bedded	17	68
	Silt and sand, light-olive-gray to greenish-gray; calcareous, sand poorly sorted, angular to subrounded	68	136
	Gravel, sandy, coarse sand to coarse gravel, unsorted, subrounded	19	155
	Silt, light-olive-gray to greenish-gray	12	167
	Gravel, sandy, coarse sand to coarse gravel, unsorted, subrounded; contains calcareous silt (probably bedded)	12	179
	Gravel, sandy, coarse sand to coarse gravel, unsorted, cemented	3	182
Fort Union Group:			
	Clay, light-gray, silty	7	189

154-101-2cdd2
C. H. Visina

Geologic source	Material	Thickness (feet)	Depth (feet)
	Clay	110	110
	Sand, coarse (water)	10	120
	Quicksand	26	146
	Sand, coarse	6	152
	Gravel, coarse	4	156
	Clay, hard	?	

154-101-12bbb
Test hole 32-776

Alluvium:			
	Soil, black	1	1
	Gravel, sandy fine sand to coarse gravel, unsorted, subrounded to rounded	7	8
	Clay, moderate-yellowish-brown, silty, oxidized	3	11
	Gravel, sandy, unsorted, subrounded to rounded	8	19
	Clay, dark-yellowish-brown, silty, slightly oxidized	4	23
Glacial drift:			
	Till, olive-gray, silty and sandy	20	43
	Gravel, sandy, unsorted, subround to rounded	9	52
	Till, olive-gray, silty, sandy	8	60
	Clay, silty to sandy, contains thin beds of very fine to coarse sand	14	74
	Sand, very fine to coarse, poorly sorted, subangular to subrounded	26	100
	Clay, olive-gray, silty, calcareous	5	105
	Sand, fine to coarse, poorly sorted, angular to subrounded	15	120
	Gravel, sandy, fine to medium, poorly sorted, subangular to rounded; predominantly brownish pebbles	17	137
Fort Union Group:			
	Clay, light-bluish-gray, silty	21	158

154-101-12bbd
Test hole 23-776

Alluvium:			
	Soil, black	1	1
	Clay, moderate-yellowish-brown, silty	2	3
	Sand, gravelly, fine to very coarse, unsorted, subangular to rounded	19	22
Glacial drift:			
	Till, dark-greenish-gray, silty	23	45
	Sand, medium to very coarse, unsorted	2	47
	Clay, olive-gray, silty	36	83
	Sand, very fine to coarse, unsorted, subrounded	34	117
	Gravel, fine to medium, unsorted, angular to rounded	14	131
Fort Union Group:			
	Clay, light-bluish-gray, silty	5	136

154-101-23cbc
Montana-Dakota Utility Co.

(Log furnished by McCarthy Well Co.)

Geologic source	Material	Thickness (feet)	Depth (feet)
	Missing	62	62
	Sand, fine, coal	46	108
	Coal, sand, some shale	46	154
	Sand, coarse, coal	45	199
	Sand and coal	22	221
	Sand, coarse	16	237
	Gravel with some shale, many rocks	53	290
	Shale, hard, some coal and clay	249	539
	Shale with seams of coal	32	571
	Coal	7	578
	Coal and shale	3	581
	Shale	14	595
	Coal	2	597
	Shale	12	609
	Sand, dirty	8	617
	Shale	15	632
	Shale with sand streaks	14	646
	Sand, clean	19	665

154-101-24bad
Williston Clinic

(Log furnished by M. P. Benson)

	Clay	90	90
	Quicksand (silty)	30	120
	Sand, coarse	10	130
	Gravel	13	143

154-101-24cbb
Farmers Union Creamery

	Clay, sandy, soft	24	24
	Clay, blue, sandy	16	40
	Clay, blue, sandy, hard	12	52
	Sand, coarse and fine mixed	8	60
	Clay, blue, sandy	20	80
	Clay, blue	25	105
	Sandy, hard and soft layers	25	130
	Clay, chocolate colored, gravel mixed	20	150
	Clay, gray, sandy	35	185
	Gravelly, hard layer	10	195
	Gravel hardpan	11	206
	Gravelly	6	212
	Gravel, loose	7	219

154-101-26cca
Corps of Engineers test hole 301

	Clay and silt	12	12
	Sand and gravel	95	107
Fort Union Group:		18	125

154-101-28bdc
Corps of Engineers test hole 171

Geologic source	Material	Thickness (feet)	Depth (feet)
	Clay	4	4
	Silt	2	6
	Sand, silty	7	13
	Silt	2	15
	Clay	25	40
	Silt	2	42
	Gravel, coarse	2	44
	Missing	5	49
Fort Union Group:			
	Clay	6	55

154-101-28cba
Corps of Engineers test hole 172

	Clay	3	3
	Silt	5	8
	Clay	4	12
	Silt, sandy	4	16
	Clay	21	37
	Missing	2	39
Fort Union Group:			
	Clay	6	45

154-101-29dcc
Corps of Engineers test hole 994

	Clay	5	5
	Silt	4	9
	Sand, silty, fine	4	13
	Missing	7	20
	Silt, sand	2	22
	Sand, silty, fine	29	51
	Gravel, coarse	1	52
Fort Union Group:			
	Clay	5	57

154-101-31add
Corps of Engineers test hole 999

	Clay	8	8
	Sand, fine	37	45
	Sand, clayey	4	49
	Sand, fine	6	55
	Silt and fine sand	37	92
	Sand, fine	5	97
	Sand, silty, fine	4	101
	Clay	3	104
	Sand, silty	17	121
	Sand, silty, fine	6	127
	Gravel, sandy	2	129
	Sand, silty, fine	5	134
	Clay	4	138
Fort Union Group:			
	Clay	5	143

154-101-32bab
Corps of Engineers test hole 1077

Geologic source	Material	Thickness (feet)	Depth (feet)
	Clay and silt----------	8	8
	Sand and gravel----------	205	213
Fort Union Group:		12	225

154-101-32bbd
Corps of Engineers test hole 997

	Clay, dark-grayish-brown, fat----------	5	5
	Clay, lean with thin layers of sandy silt-------	5	10
	Silt, dark-brown, sandy----------	4	14
	Clay, gray, lean----------	0.4	14.4
	Silt, gray, sandy----------	3.6	18
	Missing----------	1.5	19.5
	Clay, lean----------	14.3	33.8
	Silt, gray to dark-gray----------	2.7	36.5
	Sand, silty to very fine----------	6.5	43
	Sand, fine----------	1	44
	Sand, fine to silty----------	90.5	134.5
	Clay, fat----------	2	136.5
	Sand, fine to silty----------	6.5	143
	Sand, fine to medium----------	7	150
	Sand, fine to silty----------	22.5	172.5
	Sand, fine to medium----------	3.5	176
	Lignite, float----------	8	184
	Gravel, sandy----------	16	200
Fort Union Group:			
	Clay----------	4	204

154-103-9cbb

	Soil, sandy----------	1	1
	Sand, silty and clayey, very fine----------	4	5
Fort Union Group:			
	Silt and very fine sand, clayey, light-olive-gray----------	15	20

154-103-17ddd

Glacial drift:			
	Till, yellowish-gray, sandy----------	12	12
	Till, dusky-yellow to moderate-olive-brown, silty----------	14	26
Fort Union Group:			
	Sand, yellowish-green to dark-greenish-gray, fine to medium, well sorted, subangular to subrounded----------	15	41
	Sand, yellowish-green to dark-greenish-gray, clayey, fine, well sorted----------	11	52
	Shale, greenish-gray, silty----------	8	60

155-95-4ada
O. J. Bergstrom

(Log furnished by E. H. Prather)

Geologic source	Material	Thickness (feet)	Depth (feet)
	Clay, brown, gravel	15	15
	Sand and clay	2	17
	Clay, gray, rock	14	31
	Clay, brown with coal	9	40
	Sand, brown	42	82
	Sand, brown (water)	3	85
	Sand, brown (fine silt)	7	92

155-96-7ccc

Glacial drift:			
	Soil, black	1	1
	Till, dark-yellowish-orange, silty, oxidized	9	10
	Sand, medium to coarse, moderately well sorted, subrounded	47	57
	Clay, light-olive-gray to greenish-gray, sandy	10	67
	Silt, grayish-orange, oxidized	5	72
	Silt, greenish-gray to light-bluish-gray, clayey, much fine lignite	12	84
Fort Union Group:			
	Clay, light-gray, sandy and silty	10	94

155-96-20ddd

Glacial drift:			
	Soil	1	1
	Till, gravel, olive-gray to grayish-orange, gravelly, about 50 percent gravel	10	11
	Till, olive-gray	16	27
Fort Union Group:			
	Lignite	5	32
	Clay, light-olive-gray and dark-brown to black, sandy and silty, lignite; about 50 percent lignite	20	52

155-96-30bcc

Glacial drift:			
	Soil, black, silty	1	1
	Till, dusky-yellowish-brown, silty and gravelly, oxidized	9	10
Fort Union Group:			
	Clay, yellowish-brown to brownish-gray, sandy and silty, oxidized	12	22
	Clay, light-gray to brownish-gray, sandy and silty; contains thin lenses of lignite	20	42

155-97-2aaa

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Soil, black, silty	1	1
	Till, dark-yellowish-orange, silty, oxidized	27	28
	Sand, medium, moderately well sorted, subangular	12	40
	Gravel, fine to coarse, poorly sorted	5	45
	Gravel, sandy, fine sand to coarse gravel, poorly sorted, rounded to angular	32	77
	Silt and clay, grayish-orange and light-bluish-gray, interbedded	10	87
	Sand, fine to coarse, unsorted	15	102
	Gravel, unsorted	6	108
Fort Union Group:			
	Silt, greenish-gray, clayey; contains thin lignite beds	18	126

155-97-2bbb

	Soil, black, silty	1	1
	Till, dark-yellowish-orange to pale-yellowish-brown, silty, oxidized; contains 40 to 50 percent gravel	7	8
	Till, yellowish-brown, silty	28	36
Fort Union Group:			
	Silt, dark-greenish-gray to light-gray, sandy	7	43
	Clay, sand, silt, and lignite, vericolored, grayish-yellow-green, dark-yellowish-orange, grayish-purple, grayish-blue, and brownish-black	20	63
	Silt, medium-bluish-gray to greenish-gray, clayey and sandy	31	94

155-97-5bbb

Glacial drift:			
	Soil, black, silty	1	1
	Till, moderate-yellowish-brown to olive-gray, silty	44	45
	Till(?), moderate-yellowish-brown to olive-gray, sandy	37	82
	Silt, grayish-orange to dusky-yellow, laminated, oxidized	25	107
	Clay, olive-gray, sandy and silty	48	155
Fort Union Group:			
	Clay, yellowish and bluish-gray, sandy	23	178

155-99-1abc

Glacial drift:			
	Clay, dark-brown, sandy	1	1
	Sand, yellowish-gray to dusky-yellow, clayey, oxidized, loose	7	8
	Till, moderate-olive-brown, silty, oxidized	25	33
Fort Union Group:			
	Lignite, black, fissile	4	37
	Sand, light-greenish-gray, slightly clayey, very fine, friable; contains thin lenses of lignite	21	58
	Limestone, dark-gray	1	59

155-99-1abc--Continued

Geologic source	Material	Thickness (feet)	Depth (feet)
Fort Union Group--Continued:			
	Shale, varigated grays and greens, moderately soft to moderately hard	24	83
	Lignite, black, fissile	1	84
	Clay, light-greenish-gray, sandy; contains thin carbonaceous lenses	5	89
	Sand, greenish-gray, fine, well sorted, friable-	11	100

155-100-6aaa2
Test hole 14-25

Glacial drift:			
	Clay, yellowish brown, sandy, oxidized	15	15
	Gravel, coarse sand to coarse gravel	16	31
	Clay, brown and gray	51	82
	Till, gray	24	106
Fort Union Group (?):			
	Clay, gray, sandy	20	126

155-100-10bcc
Pherrin Township

(Log furnished by Schnell Inc.)

Glacial drift:			
	Clay, dark-yellowish-brown to dark-yellowish-orange, silty, oxidized	4	4
	Till, dark-yellowish-orange, silty to sandy, oxidized	34	38
	Till, olive-gray, silty to sandy	7	45
	Clay, olive-gray, silty	34	79
	Clay and sand, interbedded	5	84
	Sand, very fine to coarse, unsorted	12	96
	Sand and clay, interbedded	23	119
	Clay, olive-gray, silty	48	167
	Sand, clayey, very fine to medium	13	180
	Sand, medium to very coarse, unsorted	16	196
Fort Union Group:			
	Sand, moderate-yellow to pale-bluish-green, clayey, very fine	24	220

155-100-17adc
Pherrin Township

(Log furnished by Schnell Inc.)

Glacial drift:			
	Soil, sandy	1	1
	Clay, light-olive-gray, silty	17	18
	Till, olive-gray	20	38
	Gravel, medium, angular to subrounded	18	56
	Clay, medium-dark-gray	66	122
	Lignite	1	123
	Clay, medium-dark-gray	39	162
	Lignite	1	163
	Gravel, very coarse; brownish stained	21	184
	Clay, olive-gray	36	220

155-100-17bcc
Pherrin Township

(Log furnished by Schnell Inc.)

Geologic source	Material	Thickness (feet)	Depth (feet)
	Silt, loam	2	2
	Clay, loamy	6	8
	Sand, gravel	14	22
	Clay, gray	37	59
	Sand, fine, quicksand	25	84
	Clay	4	88
	Sand, fine	31	119
	Sand, medium and coarse	11	130
	Gravel	3	133
Fort Union Group:		7	140

155-100-18dbb
Pherrin Township

(Log furnished by Schnell Inc.)

	Soil, sandy	1	1
	Clay, gravelly, boulders	23	24
Fort Union Group:			
	Clay, brown, lignitic	3	27
	Clay, gray	11	38
	Lignite	2	40

155-100-19ddd
Pherrin Township

(Log furnished by Schnell Inc.)

	Soil, sandy	1.5	1.5
	Sand, gravel and boulders	3	4.5
	Clay, gravelly	1.5	6
	Till, yellow	12	18
	Till, gray	16	34
	Sand, gravel, and lignite	7	41
	Clay, gray	76	117
	Clay, sandy, thin sand lenses	13	130
	Lignite, sand, and gravel	15	145
Fort Union Group:			
	Clay, sandy	25	170

155-100-20cab
Pherrin Township

(Log furnished by Schnell Inc.)

	Soil, sandy	1	1
	Clay, gravelly	11	12
	Clay	20	32
	Sand, coarse, lignite	1	33
	Sand and gravel; contains thin clay lenses	11	44
	Sand, coarse; contains thin clay lenses	2	46
	Sand and gravel; contains thin clay lenses	14	60
	Clay	81	141
	Sand, lignite lenses	3	144
	Sand, gravel, boulders	11	155
Fort Union Group:		5	160

155-100-21bdd
Pherrin Township

(Log furnished by Schnell Inc.)

Geologic source	Material	Thickness (feet)	Depth (feet)
	Soil, sandy	5	5
	Clay, yellow-gray, gravelly	17	22
	Till, gray, sandy	27	49
	Clay, gray	103	152
	Gravel	1	153
	Clay, gray	10	163
	Sand, gravel, and lignite	24	187
Fort Union Group:		8	195

155-100-24baa
Pherrin Township

(Log furnished by Schnell Inc.)

	Soil, gravelly	3	3
	Gravel and sand	3	6
	Till, yellow, gravelly	8	14
	Till, gray	24	38
	Till, gray and sand lenses	14	52
	Lignite	4	56
Fort Union Group:		4	60

155-100-24bac
Pherrin Township

(Log furnished by Schnell Inc.)

	Soil, sandy	2	2
	Sand, gravel and boulders	7	9
	Till, yellow, gravelly	20	29
	Till, gray, sandy	26	55
	Lignite	3	58
Fort Union Group:		2	60

155-100-30dab
Pherrin Township

(Log furnished by Schnell Inc.)

	Soil, sandy	1.5	1.5
	Gravel, dry, boulders	9.5	11
	Clay, gravelly, boulders	22	33
	Sand, gravel, and boulders	13	46
	Sand, gravel, and lignite	2	48
	Clay, gray	57	105
	Sand, medium, and lignite	36	141
	Rock	1	142
Fort Union Group:		18	160

155-100-30ddc
Test hole 1436

Geologic source	Material	Thickness (feet)	Depth (feet)
	Sand, fine to medium, silty----------	4	4
	Sand, coarse to very coarse----------	5	9
	Gravel, fine, coarse sand, with lignite fragments----------	6	15
	Gravel, fine to medium----------	6	21
	Gravel, medium to coarse----------	10	31
Fort Union Group:			
	Clay, light-gray, sandy----------	21	52

155-100-31bbb
Test hole 1435

	Sand, silty, fine----------	5	5
	Sand, medium to very coarse----------	6	11
	Sand, coarse to granule gravel, contains some bluish-gray clay----------	9	20
	Gravel, medium to very coarse----------	17	37
	Sand, silty, fine to very coarse, minor amounts of platy, gray clay; fossils Valvata tricarinata (say), Gyraulus sp, and Pisidium sp (Identified by F. D. Holland, Jr.)--------	49	86
	Sand, coarse to fine----------	9	95
	Gravel, fine to coarse, fine to coarse sand-----	11	106
	Clay, bluish-gray, sandy, platy----------	10	116

155-100-31daal
Pherrin Township

(Log furnished by Schnell Inc.)

	Soil, sandy----------	2	2
	Sand, fine----------	14	16
	Clay----------	1	17
	Gravel and boulders, subrounded----------	19	36
	Clay, gray, (till)----------	55	91
	Sand and gravel----------	14	105
	Clay, gray----------	66	171
	Sand, coarse, and lignite----------	7	178
	Clay, gray----------	22	200

155-100-32cdc
Pherrin Township

(Log furnished by Schnell Inc.)

	Soil, sandy----------	2	2
	Till, yellow, gravelly----------	22	24
	Sand and gravel----------	10	34
	Till, yellow, sandy----------	3	37
	Sand and gravel----------	5	42
	Clay, gray; lignite layer at 60 feet----------	64	106
	Clay, gray, and sand lenses----------	11	117
	Sand and gravel----------	11	128
	Clay, gray----------	10	138
	Gravel and lignite----------	6	144
Fort Union Group:		6	150

155-101-1bbb
Test hole 1434

Geologic source	Material	Thickness (feet)	Depth (feet)
	Soil, black, sandy	3	3
	Sand, fine to medium, brown clay	7	10
	Clay, yellowish-brown, sandy, oxidized	10	20
	Till, gray	31	51
	Gravel, medium to coarse	5	56
Fort Union Group:			
	Clay, light-gray, sandy	7	63

155-101-22cca
Test hole 31-776

	Soil, black	1	1
	Clay, moderate-yellowish-brown, silty to sandy, oxidized	5	6
	Gravel, sandy, unsorted, subangular to rounded	4	10
	Clay, silty, moderate-yellowish-brown, silty, oxidized	2	12
	Gravel, sandy, angular to rounded, unsorted	5	17
	Clay, moderate-yellowish-brown, silty, oxidized	11	28
	Boulder, arkosic sandstone	1.5	29.5
	Clay (no sample)	1.5	31
	Sand, gravelly, angular to rounded, unsorted	11	42
	Sand, very fine to coarse, angular to rounded, unsorted	21	63
	Gravel, fine to medium, oxidized, grayish-yellow, silty clay	9	72
Fort Union Group:			
	Silt, light-bluish-gray, sandy	12	84

155-103-8add

Glacial drift:			
	Till, yellowish-gray, oxidized, sandy	4	4
	Till, moderate-olive-brown, silty and sandy, partially oxidized	17	21
Fort Union Group:			
	Shale, varigated with yellowish-gray, dusky-yellow, light-olive-gray, greenish-gray, and brownish-black, silty	19	40

155-103-20add

Glacial drift:			
	Soil, black, silty, sandy	2	2
	Till, yellowish-gray, sandy, oxidized	7	9
	Till, moderate-olive-brown, silty, sandy	9	18
Fort Union Group:			
	Shale, varigated with yellows, grays, greens, and blues, silty	18	36
	Lignite, black,and interbedded black, sandy shale	4	40

155-103-33cbb

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Clay, yellowish-gray, sandy, (till?)----------	5	5
	Clay, light-gray, silty, (till?)----------	3	8
	Clay, dusky-yellow, silty and sandy; appears to be layered with some fine sand----------	29	37
	Sand, fine to medium, well sorted, subangular to subrounded----------	7	44
	Sand, yellowish-green, clayey, fine----------	5	49
	Sand, fine to medium, subangular to subrounded, slightly calcareous----------	23	72
	Sand, dark-greenish-gray, clayey, fine to medium----------	17	89
Fort Union Group:			
	Shale, greenish-gray and olive-black, silty-----	21	110
	Sand, bluish-gray, fine----------	10	120

156-95-6daa
Halliburton Co.

(Log furnished by E. H. Prather)

	Clay, brown----------	31	31
	Sand, brown----------	6	37
	Clay, brown----------	16	53
	Sand, clay, brown----------	2	55
	Clay, brown----------	47	102
	Clay, gray----------	8	110
	Clay, gray, sandy----------	9	119
	Clay, green----------	2	121
	Clay, gray, sandy----------	10	131
	Clay, gray, sandy, with a trace of coal and water----------	4	135
	Clay, gray, sandy----------	17	152
	Clay, gray----------	3	155

156-95-19ddd
Test hole 736

Glacial drift:			
	Till, yellowish-gray----------	54	54
Fort Union Group:			
	Clay, dark-gray, sandy----------	1	55
	Clay, yellowish-gray----------	8	63
	Clay, light-gray----------	7	70

156-95-30ddd
Test hole 737

Glacial drift:			
	Till, yellowish-gray----------	12	12
	Sand----------	1	13
Fort Union Group:			
	Clay, light-gray----------	4	17
	Clay, sandy, yellowish-gray----------	11	28
	Clay, grayish-black----------	2	30
	Sand, yellowish-gray----------	10	40

156-96-31cbc

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Soil, black	1	1
	Till, grayish-orange, sandy, oxidized	9	10
Fort Union Group:			
	Clay, light-bluish-gray to greenish-gray, calcareous; contains a few oxidized dark-yellowish-orange patches	15	25
	Clay, medium-bluish-gray	7	32

156-97-9dbd1
City of Ray

(Log furnished by Layne-Minnesota Co.)

Hardpan	10	10
Clay	64	74
Clay and coal streaks	6	80
Coal and soft clay	7	87
Clay and sandy clay	28	115
Clay	12	127
Sand, gray, muddy	4	131
Sand, brown, muddy	22	153
Sand, coarse	11	164
Clay	5	169

156-97-9dbd2
City of Ray

(Log furnished by Simpson and Son)

Till, yellowish-gray, sandy, weathered	40	40
Till, brown; grades downward into gray, sandy till	95	135
Sand, coarse to very coarse, rounded; predominately quartz and quartzite	15	150
Gravel, dirty (included in the above 15 feet)		
Sand, very coarse, rounded quartzose	10	160

156-97-9dcc
City of Ray

(Log furnished by Simpson and Son)

Glacial drift:			
	Till, yellowish-gray, sandy, weathered	20	20
	Till, chocolate-brown, sandy	10	30
	Till, grayish-brown	20	50
	Silt, brown, sandy, carbonaceous	30	80
	Clay and silt, gray	20	100
	Sand, dirty	10	110
	Clay and sand	30	140
	Sand, coarse to very coarse	12	152
Fort Union Group:			
	Shale, light-gray	4	156

156-97-16aaa

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Till, silty and sandy, dusky-yellow to yellowish-gray, oxidized	45	45
	Till, silty, moderate-olive-brown to olive-gray, partly oxidized	20	65
	Sand, medium, well sorted, subrounded	5	70
	Silt, clay, sandy clay, olive-gray, interbedded	37	107
	Sand, medium, gray, calcareous, well sorted, subrounded	12	119
	Sand, coarse, brown, subrounded; contains some fine gravel	61	180
Fort Union Group:			
	Shale, silty, medium-gray, calcareous, moderately plastic	20	200

156-97-16abb

Glacial drift:			
	Soil, dark-brown, sandy	1	1
	Sand, yellowish-gray, clayey, probably fill	4	5
	Till, yellowish-gray to moderate-olive-brown, silty and sandy, oxidized	23	28
	Gravel, reddish-brown, fine to coarse, poorly sorted, subangular to subrounded; much iron oxide staining	6	34
	Till, moderate-olive-brown to light-olive-gray, partly oxidized	10	44
	Sand, fine, dusky-yellow to moderate-olive-brown, clayey, partly oxidized; contains some olive-gray plastic clay	9	53
	Shale, olive-gray, moderately plastic	4	57
	Clay, silt, sandy clay, sand, olive-gray to dark-greenish-gray, interbedded	35	92
	Sand, dark-greenish-gray, medium, well sorted, subrounded	25	117
	Sand, brown, coarse, subangular to subrounded	29	146
Fort Union Group:			
	Shale, light-greenish-gray, and fine calcareous sandstone	14	160

156-97-27aaa

Glacial drift:			
	Soil	1	1
	Till, yellowish-brown, sandy and gravelly, very weathered	9	10
	Till, moderate-olive-brown, sandy, oxidized; contains many bedrock pebbles	24	34
	Silt, very fine sand, moderate-olive-brown, clayey, (probably bedded)	23	57
	Silt and very fine sand	23	80
	Gravel, fine to coarse, poorly sorted, subangular to subrounded; contains much dark shale, ironstone, and iron-oxide stained limestone	32	112
	Clay, light-olive-gray, silty	2	114
	Gravel and sand, poorly sorted, subangular to subrounded	43	157
Fort Union Group:			
	Clay, light-bluish-gray, silty	2	159
	Sandstone, light-bluish-gray	3	162
	Clay, light-bluish-gray, silty, sandy	16	178

156-97-32ddd

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Soil, black	1	1
	Till, olive-gray to dark-yellowish-orange, sandy, oxidized	28	29
	Till, olive-gray, silty; contains small quantities of gypsum	22	51
	Clay, dark-yellowish-orange to olive-gray, sandy, silty, oxidized	34	85
Fort Union Group:			
	Clay, sand, sandstone, yellowish-brown	31	116

156-97-33ddd

Glacial drift:			
	Soil, black	1	1
	Till, olive-gray to dark-yellowish-orange, sandy	19	20
	Silt, grayish-yellow; contains iron oxide stained calcareous silt concretions	31	51
Fort Union Group:			
	Lignite, brownish-black, clayey	12	63

156-98-9ddd

Glacial drift:			
	Soil, black	1	1
	Till, moderate-yellowish-brown to light-olive-gray, silty	19	20
Fort Union Group:			
	Clay, dark-yellowish-brown, sandy, slightly calcareous	43	63

156-98-35ccd

Glacial drift:			
	Loam, sandy, pebbly	1	1
	Clay, yellowish-gray to reddish-brown, silty and sandy, oxidized, contains thin lenses of gravel	8	9
	Silt and very fine clayey sand, dusky-yellow, oxidized, contains numerous iron concretions and streaks of highly ferruginous clay, white clay, black carbonaceous clays	17	26
Fort Union Group:			
	Shale, dark-greenish-gray	4	30

156-99-13bbb

	Soil, black, silty	3	3
	Sand, yellowish-gray, fine to coarse, subangular to subrounded	4	7
	Till, dusky-yellow, silty to sandy, oxidized	11	18
Fort Union Group:			
	Shale, yellow to moderate-olive-gray, silty, calcareous with black carbonaceous streaks	12	30
	Sand, dark-greenish-gray, clayey, very fine to fine, calcareous	10	40

156-100-7ccc2
Test hole 1439

Geologic source	Material	Thickness (feet)	Depth (feet)
	Sand, clayey, fine	6	6
	Sand, fine to coarse	35	41
	Clay, gray, sandy	11	52

156-100-17aab
Test hole 1438

	Clay, sandy	6	6
	Sand, medium to coarse	5	11
	Clay, yellow to brown; contains some fine gravel	15	26
	Sand, fine	7	33
	Sand, medium to very coarse, contains some lignite fragments	21	54
Fort Union Group (?):			
	Clay, gray, sandy	9	63

156-100-18bbb

	Soil, black, silty	1	1
	Clay, yellowish-brown, silty	6	7
	Sand, gravelly, medium to very coarse, subangular to subrounded, contains about 25 percent fine gravel	3	10
	Clay, olive-gray, silty, plastic	2	12
	Gravel, sandy, fine to coarse, subangular to subrounded, contains about 25 percent fine to medium sand	15	27
	Till, olive-gray, silty, contains some very fine sand	22	49
	Clay, olive-gray, silty, plastic	19	68
	Till, olive-gray, silty, contains some very fine sand and shale pebbles	48	116
	Clay, olive-gray, silty, cohesive	4	120
	Clay, olive-gray to olive-black, silty, calcareous, cohesive	38	158
	Sand, fine to medium	2	160
	Clay, olive-gray, silty	30	190
	Clay, olive-gray, silty and sandy, silt	8	198
	Gravel, dark-brown, fine to coarse	12	210
Fort Union Group:			
	Sand, light-greenish-gray, clayey, calcareous, olive-gray to olive-black shale	21	231

156-100-33ccc
Test hole 1433

	Silt and sand, brown	4	4
	Gravel, fine to medium	5	9
	Clay, yellow, fine gravel	14	23
	Till, medium-gray	15	38
	Sand, coarse; contains some lignite	12	50
	Clay, gray, sandy	13	63

156-101-12ccc
Test hole 1440

Geologic source	Material	Thickness (feet)	Depth (feet)
	Clay, brownish-gray----------	11	11
	Till, brown, oxidized----------	12	23
	Till, gray; contains fine to medium gravel and some shale pebbles----------	21	44
Fort Union Group(?):			
	Clay, gray, sandy----------	8	52

156-101-15cbb
M. K. Harstad

(Log furnished by M. P. Benson)

	Drift, mixture of clay and stone----------	50	50
	Clay, yellow----------	111	161
	Sandstone----------	2	163
	Clay, sandy----------	27	190
	Clay, white----------	30	220
	Clay, blue----------	38	258
	Coal, slack----------	3	261
	Coal, hard----------	4	265

156-103-9bbb

Glacial drift:			
	Soil, dark-brown, sandy----------	2	2
	Sand, clayey and silty, fine to medium, poorly sorted----------	4	6
	Till, dusky-yellow, silty and sandy, oxidized; contains thin lenses of sand and fine gravel-	9	15
	Till, moderate-olive-brown, silty to sandy, oxidizied----------	17	32
	Gravel, sandy, subangular to subrounded---------	4	36
	Shale, dusky-yellow and olive-green, silty------	7	43
	Gravel, fine to medium, poorly sorted; contains many dark-brown pebbles, predominately jasper, chert, and ironstone----------	5	48
Fort Union Group:			
	Shale, medium gray, silty, slightly fissile-----	7	55
	Shale, dark-gray----------	5	60

156-103-16ccc

Glacial drift:			
	Soil, dark-brown, pebbly----------	2	2
	Till, yellowish-gray, sandy, oxidized----------	6	8
	Till, dusky-yellow, silty, oxidized----------	16	24
Fort Union Group:			
	Sand, dusky-yellow to olive-green, silty and clayey, lignitic, micaceous, and calcareous--	12	36
	Shale, medium-bluish-gray, hard----------	4	40

156-103-32add

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Soil, dark-brown, gravelly----------	2	2
	Till, yellowish-gray, sandy and silty, oxidized-	5	7
	Till, moderate-olive-brown, sandy and silty, oxidized----------	11	18
	Boulder, granitic----------	2	20
Fort Union Group:			
	Shale, dusky-yellow to medium-gray, very silty, calcareous----------	20	40

157-95-11cdd
Rudolph Weflin

Clay, rocks----------	15	15
Sandstone, yellow----------	15	30
Shale, brown, sandy----------	20	50
Sand, gray----------	25	75
Shale, gray, sandy----------	4	79
Coal (water)----------	5	84
Clay, gray (pocket)----------	6	90

157-95-21a
Tioga Golf Course

(Log furnished by E. H. Prather)

Gravel, rock----------	10	10
Rock, gravel, some clay----------	5	15
Clay, brown, rock and gravel----------	7	22
Clay, gray, some rock----------	54	76
Clay, brown, sandy----------	49	125
Sand, brown (water)----------	6	131
Shell, hard----------	3	134

157-95-26abb2
Signal Oil & Gas Co.

Clay, sandy, boulders----------	25	25
Clay, black, soft----------	25	50
Shale, blue----------	35	85
Shale, blue, coal----------	8	93
Sandstone----------	2	95
Shale, blue----------	12	107
Shale, blue, coal streaks----------	2	109
Sand----------	5	114
Shale, blue----------	3	117
Shale, blue, coal streaks----------	1	118
Shale, blue----------	17	135
Shale, blue, coal streaks----------	10	145
Shale, blue----------	40	185
Shale, blue, coal streaks----------	5	190
Shale, sandy----------	5	195

157-95-26abc1
Signal Oil & Gas Co.

Geologic source	Material	Thickness (feet)	Depth (feet)
	Clay, sandy, boulders	25	25
	Clay, black	25	50
	Gravel	2	52
	Shale, gray	28	80
	Shale, blue	12	92
	Sandstone	2	94
	Shale, blue, coal streaks	26	120
	Shale, sandy	17	137
	Shale, sandy, coal streaks	6	143
	Shale, gray	9	152
	Shale, gray, coal streaks	3	155
	Shale, gray	15	170
	Shale, sandy	17	187
	Shale, sandy, coal streaks	4	191
	Shale, gray	19	210
	Shale, gray, coal streaks	2	212
	Shale, gray	32	244
	Shale, gray, coal streaks	3	247
	Shale, gray	8	255

157-95-26abc2
Signal Oil & Gas Co.

	Clay, sandy	47	47
	Gravel	3	50
	Clay, sandy	5	55
	Clay, blue, soft	25	80
	Shale, blue, coal streaks	12	92
	Sand and gravel	3	95
	Shale, gray	34	129
	Coal	2	131
	Shale, gray	19	150
	Sandstone	3	153
	Shale, gray	4	157
	Coal	1	158
	Shale, gray	17	175
	Shale, gray, sandy	8	183
	Shale, gray	67	250
	Coal	3	253
	Shale, gray	2	255

157-95-26acb3
Signal Oil & Gas Co.

	Clay, sandy, boulders	60	60
	Clay, black, soft	10	70
	Sand and gravel	20	90
	Shale, gray	41	131
	Coal	3	134
	Shale, gray	6	140
	Sandstone	2	142
	Shale, gray	6	148
	Coal	2	150
	Shale, gray	15	165
	Shale, gray, sandy	10	175
	Coal	3	178
	Shale, gray	59	237
	Coal	3	240
	Shale, gray	4	244
	Coal	5	249
	Shale, gray	6	255

157-95-26acb4
Signal Oil & Gas Co.

Geologic source	Material	Thickness (feet)	Depth (feet)
	Clay, sandy, boulders	50	50
	Shale, yellow, sandy	15	65
	Clay, soft	4	69
	Sand and gravel	12	81
	Shale, blue	17	98
	Coal	3	101
	Shale, gray	31	132
	Coal	4	136
	Shale, gray	14	150
	Coal	1	151
	Shale, gray	7	158
	Coal	1	159
	Shale, gray, sandy	14	173
	Coal	2	175
	Shale, gray	4	179
	Sandstone	2	181
	Shale, gray	24	205

157-95-26acc3
Signal Oil & Gas Co.

	Clay, sandy, boulders	43	43
	Sand and gravel	7	50
	Clay, blue, soft	7	57
	Sand and gravel	11	68
	Shale, blue	34	102
	Coal	1	103
	Shale, blue	9	112
	Coal	2	114
	Shale, gray	15	129
	Coal	2	131
	Shale, gray, sandy	25	156
	Coal	5	161
	Shale, gray	28	189
	Coal	3	192
	Shale, gray	13	205

157-95-27acd1
City of Tioga, Well 1

(Log furnished by Layne-Minnesota Co.)

	Clay, yellow (fill)	2	2
	Soil, black	2	4
	Clay, brown, sandy	6	10
	Gravel, very clayey	8	18
	Clay, blue	10	28
	Clay, brown, very sandy	5	33
	Sand and gravel, clayey	7	40
	Sand and gravel, slightly clayey	10	50
	Clay, yellow, very gravelly	11	61
	Clay, gray	24	85
	Clay or shale, gray, slightly sandy, with coal particles	20	105
	Clay, gray; with coal chunks and gravelly clay	17	122
	Clay and sand, brown, with coal	6	128
	Clay or shale, gray	17	145
	Small amount of water from 65 to 125 feet		

157-95-27ada
City of Tioga, Well 9

(Log furnished by Simpson and Son)

Geologic source	Material	Thickness (feet)	Depth (feet)
	Topsoil	1	1
	Clay, brown	1	2
	Clay, yellow, gravelly, hard	33	35
	Clay, blue, soft, sticky	10	45
	Clay, gray, sandy	8	53
	Clay, light-gray (green tinge)	9	62
	Sand and gravel	6	68
	Clay, gray, sandy, (caves)	63	131
	Clay or shale, gray	20	151

157-95-27add
City of Tioga, Well 2

(Log furnished by Simpson and Son)

	Topsoil	0.5	0.5
	Clay, yellow	27.5	28
	Clay, gray, sandy	21	49
	Clay, yellow, sandy	5	54
	Clay, gray, sandy	11	65
	Clay, brown, sandy	7	72
	Sand, fine and coarse, with pebbles and clay	18	90
	Clay, gray, sandy	12	102
	Clay, gray, very sandy	20	122
	Clay or shale, light-gray	8	130
	Clay or shale, gray	10	140
	Clay or shale, dark-gray	1	141
	Shale, gray	24	165

157-95-27bdd
City of Tioga, Well 3

(Log furnished by Simpson and Son)

	Topsoil	1	1
	Clay, yellow, sandy	28	29
	Clay, yellow, very sandy, with rocks	16	45
	Sand, yellow, clayey, fine, pebbles	20	65
	Clay, very light-gray	28	93
	Sand, muddy, fine, coarse gravel	1	94
	Clay, gray, gravelly	4	98
	Sand and gravel, clayey	6	104
	Sand, gravel, pebbles, clay	5	109
	Gravel, clay, dirty sand	19	128
	Clay, blue, gravelly	12	140

157-95-27dbd
City of Tioga, Well 4

(Log furnished by Simpson and Son)

	Topsoil	1	1
	Clay, yellow, pebbly, hard	4	5
	Clay, yellow	40	45
	Clay, blue, sticky	10	55
	Clay, blue, slightly sandy	13	68
	Clay, yellow, sandy	17	85
	Sand, gray, clayey, fine, with coal chunks	7	92

157-95-27dbd--Continued
City of Tioga, Well 4

(Log furnished by Simpson and Son)

Geologic source	Material	Thickness (feet)	Depth (feet)
	Clay, blue, sandy	10	102
	Sand, medium fine with some clay (somewhat dirty, water level about 52 feet)	4	106
	Clay, blue, gravelly	4	110
	Gravel, coarse	5	115
	Sand, muddy, fine	3	118
	Gravel	1	119
	Clay, sandy and gravelly	3	122
	Sand, muddy, fine, with coal chunks	22	144
	Shale, gray	6	150

157-95-27dcb
City of Tioga, Well 8

(Log furnished by Simpson and Son)

	Topsoil	1	1
	Clay, yellow, gravelly, hard; rocks	44	45
	Clay, yellow, sandy	20	65
	Clay, gray, sandy, soft	26	91
	Clay, brown, very sandy	9.5	100.5
	Sand, very fine, with gravel	1.5	102
	Clay, very sandy	14	116
	Sand, somewhat clayey, with broken coal; water-	3	119
	Clay or shale, gray	3	122

157-95-27ddb
City of Tioga, Well 5

(Log furnished by Simpson and Son)

	Topsoil	0.5	0.5
	Gravel, stones, clay	2.5	3
	Clay, yellow, hard	9	12
	Clay, yellow, sandy	34	46
	Clay, yellow, very sandy; some water	12	56
	Clay, gray, sandy	5	61
	Sand, gray, fine, dirty, with broken coal; water	3	64
	Clay, light-gray, sandy	12.5	76.5
	Sand, fine, dirty; water	3.5	80
	Clay, gray, sandy; some water	10	90
	Gravel, coarse sand; water	1	91
	Clay, gravelly	1	92
	Shale, light-gray, very sandy	31	123
	Coal	1	124
	Shale, gray	2	126

157-95-27ddc
City of Tioga, Well 6

(Log furnished by Simpson and Son)

	Topsoil	1	1
	Gravel, rocks	1	2
	Clay, yellow	15	17
	Clay, yellow, sandy	39	56
	Clay, gray, with coal particles	40.5	96.5
	Sand and gravel	1.5	98
	Clay, blue	2	100

157-96-19baa

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Loam, dark-brownish-black, pebbly	2	2
	Till, yellowish-gray, sandy, oxidized	7	9
	Till, dusky-yellow to moderate-olive-brown, silty, oxidized	25	34
	Till, moderate-olive-brown, very silty, oxidized	68	102
	Till, pink, silty	3	105
	Gravel, sandy, fine to medium; pebbles are predominantly limestone, shale, and lignite	4	109
	Till, olive-gray, silty	69	178
	Sand, gray, lignitic, medium, well sorted, subrounded	15	193
	Gravel, sandy, fine and medium, apparently bedded; most pebbles are iron stained	26	219
Fort Union Group:			
	Shale, medium-gray, silty	14	233
	Sand, greenish-gray, fine	7	240

157-97-3bbb

Glacial drift:			
	Soil, dark-brown, sandy	1	1
	Till, yellowish-gray, sandy, oxidized	14	15
	Till, yellowish-gray to moderate-olive-brown, silty and sandy, oxidized	65	80
	Till, moderate-olive-brown and olive-gray, silty and sandy, partly oxidized	20	100
	Till, olive-gray, silty and sandy	30	130
	Clay, olive-gray, silty, very cohesive	8	138
	Sand, gravelly, medium to coarse, subangular to subrounded; predominantly quartz, chert, ironstone, and lignite with some shale and very few limestone pebbles and grains	65	203
Fort Union Group:			
	Shale, light-gray, light-greenish-gray, brown, and black, silty, calcareous, plastic; contains some medium-gray limestone, ironstone concretions and lignite	17	220

157-97-3ddd

Glacial drift:			
	Soil, black, sandy and silty	1	1
	Sand, clayey, poorly sorted	2	3
	Till, yellowish-gray, silty and sandy, oxidized	12	15
	Till, moderate-olive-brown, silty and sandy, oxidized	10	25
	Clay, light-olive-gray, silty, calcareous, plastic, cohesive	15	40
	Sand, light-olive-gray, clayey, fine to medium	5	45
	Till, dusky-yellow, silty and sandy, oxidized	7	52
	Clay, olive-gray to olive-black with olive-brown streaks, silty; contains sand grains, pebbles, and lignite fragments	28	80
	Till, olive-gray, silty	63	143
	Sand, medium to coarse, subangular to subrounded; contains some finer and coarser grains	42	185
Fort Union Group:			
	Shale, light-greenish-gray	15	200

157-97-6aaa

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Soil, black	1	1
	Till, yellowish-gray, silty and sandy, oxidized; contains a few gravel lenses	21	22
	Clay, dusky-yellow, silty, oxidized, cohesive	8	30
	Gravel, reddish-brown, fine, oxidized	2	32
	Clay, olive-gray, silty, cohesive	5	37
	Till, moderate-olive-brown, silty, oxidized; contains gravelly streaks	5	42
	Till, olive-gray, silty	28	70
	Sand, gray, coarse, well sorted, subrounded	3	73
	Clay, olive-gray with varigated streaks, silty, calcareous, cohesive (may be a clay boulder from the Tongue River Formation)	16	89
	Till, olive-gray, silty; contained a 1 to 2 foot layer of pink to salmon colored till at about 90 feet	10	99
	Clay, olive-gray, silty and very fine sand; may be bedded	18	117
	Sand, medium-gray, fine to medium, well sorted, subangular to rounded	14	131
	Sand, light-brown, medium to very coarse, moderately well sorted, subangular to subrounded; predominantly quartz with minor amounts of limestone and shale	70	201
Fort Union Group:			
	Shale, light-gray, slightly calcareous, light-olive-gray, clayey sand	19	220

157-97-13ccc

	Loam, dark-brownish-black, pebbly	2	2
	Till, dusky-yellow to yellowish-gray to moderate-olive-brown, very silty, oxidized	39	41
	Till, yellowish-gray to moderate-olive-brown, silty, oxidized	36	77
	Till, moderate-olive-brown, sandy; partially oxidized	20	97
	Silt, olive-gray to olive-black, clayey, calcareous, cohesive	5	102
	Till, pink, silty	5	107
	Till, olive-gray, silty	41	148
	Cobbles, (very rough drilling)	5	153
	Till, olive-gray, silty	18	171
	Clay, medium-gray, silty, very cohesive	6	177
	Sand, gray, lignitic, medium to coarse, well sorted, subangular to subrounded	16	193
	Clay, gray, cohesive	2	195
	Sand, gray, medium	2	197
	Clay, gray	1	198
	Sand, gray, lignitic, medium with some coarse grains	7	205
	Clay, olive-gray to dark-greenish-gray, sandy, cohesive	6	211
	Sand, medium to very coarse, with fine to medium, yellowish-brown gravel; well sorted in beds	19	230
	Sand, medium to coarse, well sorted	4	234
	Sand, gray, clayey, fine to medium	5	239
	Gravel, dark-brown, sandy, fine to coarse	25	264
	Gravel, dark-brown, sandy; contains lenses of light- and medium-gray clay	38	302
Fort Union Group:			
	Shale, white to medium-gray	13	315

157-97-14ccc

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Soil, black, sandy and clayey----------	1	1
	Sand, yellowish-gray, clayey----------	4	5
	Till, dusky-yellow to moderate-olive-brown, silty, oxidized----------	40	45
	Till, olive-gray, very silty----------	5	50
	Shale, olive-gray, silty and sandy, plastic-----	30	80
	Gravel, sandy, fine to coarse, subangular; predominantly limestone, chert, and ironstone with some granitic rocks, sandstone, shale, and lignite----------	40	120
	Silt, moderate-olive-brown, light-olive-gray, and olive-gray; contains some dark-greenish-gray sandy clay and medium-gray clay (possibly bedded)----------	18	138
	Till, olive-gray, silty and sandy----------	12	150
	Sand, gravelly, fine to very coarse, poorly sorted, subangular to subrounded; predominatly limestone, chert, shale, and quartz-------	14	164
	Clay (till?), olive-gray, silty----------	11	175
	Sand, brown, fine to very coarse, poorly sorted, generally subrounded, predominantly quartz and chert----------	45	220
Fort Union Group:			
	Shale, light-gray and light-greenish-gray, calcareous, moderately plastic----------	20	240

157-91-21aaa

Glacial drift:			
	Loam, black, pebbly----------	1	1
	Till, yellowish-gray to light-olive-gray, silty, oxidized----------	21	22
	Silt, dusky-yellow, clayey, oxidized----------	18	40
	Clay, light-olive-gray to olive-gray, silty, smooth----------	10	50
	Till, moderate-olive-brown, silty; contains a few very thin lenses of sand and fine sand---	58	108
	Gravel, sandy, fine to medium, poorly sorted, subrounded, iron stained pebbles----------	3	111
	Till, olive-gray to olive-black, silty, till is sandy near bottom of interval----------	19	130
	Gravel, sandy, fine to medium, poorly sorted----	3	133
	Till, olive-gray to olive-black, silty----------	6	139
	Lignite, black, detrital----------	3	142
	Sand, fine to medium, well sorted, subangular to subrounded; grains are predominantly quartz and lignite----------	36	178
	Sand, medium to very coarse, fine to medium, yellowish-brown gravel----------	22	200
Fort Union Group:			
	Clay, white, soft; greenish-gray, clayey sand, medium-gray shale; sand, clay, and shale are interbedded----------	20	220

157-97-36ccc

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Soil, black	1	1
	Till, moderate-yellowish-brown, sandy, oxidized in patches	49	50
	Till, moderate-yellowish-brown	43	93
	Silt, moderate-yellowish-brown, and dark-yellowish-brown clay, laminated; some fine white sand in some laminations	4	97
	Gravel (poor sample)	2	99
	Till, medium-gray to olive-gray	36	135
	Till, olive-gray to dark-greenish-gray	21	156
	Sand, silty to gravelly, poorly sorted, angular to rounded	10	166
	Gravel, sandy, poorly sorted, subangular to rounded; average size about 2 millimeters	58	224
	Gravel, sandy, clayey, poorly sorted, predominantly subrounded	7	231
Fort Union Group:			
	Clay, light-olive-gray, contains lignite fragments	21	252

157-99-19dcd
Test hole 17-776

Glacial drift:			
	Soil	1	1
	Till, dark-yellowish-brown, oxidized	10	11
	Till, moderate-yellowish-brown, silty to sandy, oxidized	28	39
	Till, light-olive-gray, silty	19	58
	Silt, dark-yellowish-brown, calcareous, very fine to fine sand, laminated; contains some light-brown limonitic laminae	6	64
	Till, moderate-yellowish-brown, silty, oxidized; contains thin lenses of gravel	9	73
	Till, light-olive-gray, silty	48	121
Fort Union Group:			
	Clay, grayish-green, silty, calcareous	5	126

157-99-34bcc

Glacial drift:			
	Sand, unsorted	1	1
	Till, dusky-yellow, sandy	22	23
	Gravel, sandy, poorly sorted, angular to rounded	7	30
	Clay, dark-greenish-gray, silty, calcareous	95	125
	Gravel, poorly sorted, subangular to rounded	3	128
Fort Union Group:			
	Clay, multicolored ranging from olive-black to light-olive-gray, lignitic	30	158

157-100-5ddd

Glacial drift:			
	Gravel, fine to coarse, poorly sorted, oxidized	11	11
	Sand, olive-gray, medium, lignitic, well sorted, subrounded	13	24
	Gravel, fine to coarse, lignitic, moderately well sorted	8	32
	Till, olive-gray, silty; contains many rocks	6	38

157-100-5ddd--Continued

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift--Continued:			
	Till, olive-gray, silty	52	90
	Till, olive-gray, sandy	20	110
	Clay, olive-gray, silty	20	130
	Sand, olive-gray, fine to medium, well sorted, contains thin clay lenses	15	145
	Clay, olive-gray, sandy	7	152
	Sand, apparently fine to medium, may be somewhat clayey (poor samples)	68	220
	Sand, gravelly; contains some clay	20	240
	Clay, olive-gray, silty, calcareous, moderately cohesive, plastic	36	276
	Gravel, fine to coarse, subrounded	2	278
Fort Union Group:			
	Silt, olive-gray to olive-black, calcareous, light-greenish-gray, clayey sandstone	16	294

157-101-23add

Glacial drift:			
	Sand, fine to very coarse, fine to medium, brown gravel (apparently in lenses), pebbles predominantly limestone, granitic, and shale-	17	17
	Clay, olive-gray to olive-black, carbonaceous, plastic, smooth	12	29
	Gravel, sandy, fine to medium, moderately sorted, subrounded; pebbles are predominantly light and dark igneous, white and light-yellow limestone and dark shale	10	39
Fort Union Group:			
	Shale, olive-gray to olive-black, slightly calcareous, plastic to nonplastic, moderately hard	41	80

157-103-2aaa

Glacial drift:			
	Sand, yellowish-gray, silty to gravelly	5	5
	Till, moderate-olive-brown, silty to sandy, oxidized	17	22
Fort Union Group:			
	Shale, varigated yellows, reds, and light grays, silty, oxidized	13	35
	Shale, olive-gray to dark-greenish-gray	5	40

157-103-23aad

Glacial drift:			
	Sand, yellowish-gray, clayey	4	4
	Clay, yellowish-white, sandy, very calcareous	3	7
	Till, dusky-yellow, sandy, oxidized	9	16
	Till, yellowish-gray to moderate-olive-brown, silty and sandy	36	52
	Gravel, sandy, poorly sorted, subangular to subrounded; pebbles, principally limestone are coated with iron oxide	4	56
	Till, moderate-olive-brown to light-olive-gray, silty and sandy, partly oxidized	6	62

157-103-23aad--Continued

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift--Continued:			
	Till, olive-gray, silty----------	62	124
Fort Union Group:			
	Shale, medium-bluish-gray, silty and very fine sand, calcareous----------	19	143
	Lignite, black, fissile----------	5	148
	Shale, medium-gray, calcareous, lignite, interbedded----------	12	160

157-103-26daa

Glacial drift:			
	Sand, yellowish-gray, clayey----------	2	2
	Till, moderate-olive-brown, sandy, oxidized-----	6	8
	Till, yellowish-gray to moderate-olive-brown, silty to sandy----------	13	21
	Sand, dusky-yellow, clayey to gravelly, poorly sorted, subangular to subrounded----------	7	28
	Till, dusky-yellow, silty and sandy, oxidized---	26	54
	Sand, brown, fine and medium, well sorted, subrounded----------	5	59
	Till, moderate-olive-brown, sandy, oxidized-----	9	68
	Till, moderate-olive-brown to light-olive-gray, silty, partly oxidized----------	8	76
	Clay, medium-bluish-gray, calcareous----------	6	82
	Silt and clayey sand, bluish-gray to greenish-gray, calcareous, slightly friable----------	4	86
	Gravel, brown, sandy, fine to coarse, principally iron oxide stained chert, limestone, and shale pebbles----------	6	92
	Clay, olive-green, very sandy; principally reworked Fort Union Group sediments---------	5	97
Fort Union Group:			
	Shale, olive-green to medium-gray, hard---------	23	120

158-95-26bbb
Test hole 730

Glacial drift:			
	Soil, black----------	2	2
	Till, light-gray----------	1	3
	Till, yellow----------	3	6
	Sand, gravel----------	2	8
	Till, blue-gray----------	45	53
	Till, yellow----------	40	93
Fort Union Group:			
	Clay, yellow, sandy----------	12	105

158-96-2cdd
Test hole 1643

Glacial drift:			
	Soil, black----------	3	3
	Clay, yellow, fine gravel----------	18	21
	Till----------	21	42
	Clay, brown, sandy----------	64	106
	Gravel, fine to coarse; drilled as though cemented----------	8	114
	Clay, gray----------	13	127
Fort Union Group:		9	136

158-96-14cdd
Test hole 1635

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Soil, black	4	4
	Clay, yellow, medium to coarse gravel	7	11
	Clay, black, silty	21	32
	Clay, greenish-gray; contains minor quantities of lignite and fine gravel	95	127
Fort Union Group:			
		9	136

158-96-23baa
Test hole 1634

Glacial drift:			
	Soil, black	3	3
	Clay, light-gray, silty	3	6
	Sand, coarse, fine gravel	5	11
	Till, gray	32	43
	Clay, gray, silty	32	75
	Gravel, fine to medium	9	84
	Till	33	117
Fort Union Group:			
		9	126

158-97-19aaa

Glacial drift:			
	Clay, yellowish-gray, sandy	4	4
	Till, dusky-yellow, sandy, oxidized	12	16
	Till, moderate-olive-brown, silty and sandy	70	86
	Sand, gray, medium, moderately well sorted, subrounded	8	94
	Clay, olive-gray, silty	5	99
	Sand, fine to coarse, subangular to subrounded	3	102
	Till, olive-gray, silty	35	137
	Sand, gray, medium, well sorted, subrounded	13	150
	Sand, brown, gravelly, subangular to subrounded; predominantly chert and quartz	36	186
Fort Union Group:			
	Clay, light-gray, light-greenish-gray, greenish-gray, brownish-black, silty, calcareous, locally carbonaceous	14	200

158-97-22dcd

Glacial drift:			
	Gravel, reddish-brown, sandy, poorly sorted	5	5
	Till, yellowish-gray to dusky-yellow, sandy, oxidized	9	14
	Till, moderate-olive-brown, silty to sandy, oxidized	42	56
	Sand, gray, fine to coarse, predominately quartz and detrital lignite	15	71
	Till, olive-gray, silty	12	83
	Till, olive-gray, silty; contains thin lenses of fine to medium, sandy gravel	29	112
	Till, olive-gray, silty to sandy	49	161
	Sand, brownish-yellow, gravelly, medium to very coarse, moderately sorted, subangular	13	174
Fort Union Group:			
	Shale, medium-gray, moderately calcareous, very cohesive	8	182
	Sand, varigated with shades of gray, brown, black, purple, and green, very clayey	8	190

158-97-28aaa

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Loam, dark-brownish-black, sandy----------	1	1
	Till, moderate-olive-brown, silty, oxidized-----	49	50
	Sand, gray, fine to coarse, grades into fine to medium, reddish-brown gravel----------	24	74
	Till, olive-gray, silty to sandy----------	83	157
	Sand, medium to very coarse, fine to medium, and yellowish-brown gravel lenses; individual lenses apparently well sorted----------	46	203
Fort Union Group:			
	Shale, medium-gray, slightly calcareous---------	5	208
	Silt, white to light-gray, clayey, calcareous---	8	216
	Sand, light-olive-gray to light-greenish-gray, clayey, very fine----------	4	220

158-97-33bbb

Glacial drift:			
	Soil, dark-brown, sandy, clayey----------	1	1
	Sand and gravel, locally clayey, subangular to subrounded----------	5	6
	Till, moderate-olive-brown, silty and sandy, oxidized----------	54	60
	Till, olive-gray----------	40	100
	Till, olive-gray, silty and sandy----------	18	118
	Sand, brown, gravelly, medium to very coarse, subangular to subrounded----------	87	205
Fort Union Group:			
	Clay, light-olive-gray to light-greenish-gray, very sandy and silty; calcareous----------	15	220

158-98-4ccc

Glacial drift:			
	Soil, dark-brown, sandy----------	1	1
	Sand, gravelly, fine to very coarse, poorly sorted, subangular to subrounded, iron oxide coated----------	5	6
	Clay, dusky-yellow, silty, oxidized----------	12	18
	Till, moderate-olive-brown, silty, oxidized-----	8	26
	Till, olive-gray, silty----------	42	68
	Silt, olive-gray, clayey to sandy----------	9	77
	Gravel, fine to coarse, poorly sorted, subangular to subrounded----------	4	81
	Predominately limestone, shale, and lignite pebbles----------	3	84
	Sand, gravelly, medium, coarse----------	11	95
	Till, olive-gray, gravelly----------	11	106
	Sand, gray, fine to coarse, subangular to subrounded----------	20	126
	Gravel, dark-brown, fine to coarse, subangular to subrounded----------	18	144
Fort Union Group:			
	Clay, light-gray, silty, calcareous----------	3	147
	Sand, dark-greenish-gray, clayey, calcareous, slightly cohesive----------	3	150
	Shale, medium-gray, silty, calcareous----------	10	160

158-98-7ddd

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Soil, black	1	1
	Till, dusky-yellow to yellowish-gray	41	42
	Till, dark-greenish-gray to olive-gray	14	56
	Sand, gravelly, poorly sorted, angular to rounded; contains a few thin clay lenses	13	69
	Till, olive-gray to dark-greenish-gray	15	84
	Silt, dark-greenish-gray, clayey, calcareous	11	95
	Clay, dark-greenish-gray to dusky-yellow, silty, calcareous	5	100
	Till, moderate-yellowish-brown to dark-yellowish-orange, oxidized	45	145
	Till, olive-gray	31	176
	Till, gravelly; about 50 percent gravel	11	187
	Gravel, sandy, poorly sorted, angular to rounded	14	201
	Clay, light-olive-gray to olive-gray, silty, calcareous	7	208
	Clay, pale-olive, calcareous; contains lignite	10	218
	Sand, gravelly, poorly sorted, subrounded to rounded, predominant size about 2 millimeters	24	242
	Till, light-olive-gray, silty and gravelly; contains much lignite	18	260
	Gravel, sandy, poorly sorted, angular to rounded	24	284
Fort Union Group:			
	Clay, light-olive-gray, yellowish-gray, dark-greenish-gray and medium-bluish-gray	20	304

158-98-9dad
Test hole 1520

Glacial drift:			
	Soil, black	2	2
	Till, light-yellow to buff, oxidized	8	10
	Till, yellow to light-brown, oxidized	13	23
	Till, dark-gray	51	74
	Clay, light-gray to buff, silty	20	94
	Clay, light-gray, silty	11	105
	Till, dark-gray	32	137
	Sand, gravelly, coarse	32	169
Fort Union Group:			
	Clay, light-gray, sandy	9	178

158-98-13 ccb

Glacial drift:			
	Till, yellowish-gray to moderate-olive-brown, silty and sandy, oxidized	40	40
	Clay, silt, olive-gray, interbedded	22	62
	Till, olive-gray, silty to sandy	61	123
	Sand, brown, medium to very coarse, interbedded with fine to coarse gravel, brown silt and clay; predominantly quartz and chert	116	239
Fort Union Group:			
	Lignite, black, fissile	5	244
	Clay, light-gray, silty and sandy, calcareous	16	260

158-98-21aaa
Test hole 1519

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Till, yellowish-gray, sandy, oxidized----------	21	21
	Till, light-gray, oxidized----------	15	36
	Till, yellow to buff, sandy, oxidized----------	27	63
	Till, light-brown to brown; sandy near 85 feet--	22	85
	Gravel, sandy----------	9	94
	Till, light-gray----------	19	113
	Sand, silty to clayey, fine to coarse----------	56	169
Fort Union Group:			
	Clay, light-gray, sandy and silty, carbonaceous-	20	189

158-99-5bbb

Glacial drift:			
	Soil, black----------	1	1
	Till, light-olive-gray, silty; contains oxidized fragments----------	7	8
	Till, dusky-yellow to light-olive-gray, silty; contains oxidized fragments----------	23	31
	Boulder, granite----------	.5	31.5
	Till, dusky-yellow to light-olive-gray, silty; contains oxidized fragments----------	21.5	53
	Till, olive-gray----------	19	72
	Sand, gravelly, poorly sorted, subrounded to subangular----------	6	78
	Till, olive-gray to dark-greenish-gray----------	79	157
	Sand, fine to medium----------	1	158
Fort Union Group:			
	Clay, olive-gray to dark-greenish-gray, silty and sandy, calcareous----------	31	189

158-99-7ddd

Glacial drift:			
	Soil, black----------	1	1
	Till, dusky-yellow to light-olive-gray, silty, partly oxidized----------	49	50
	Sand, gravelly, poorly sorted, subangular to subrounded, oxidized----------	10	60
	Silt, light-olive-gray, clayey, calcareous, interbedded with angular to subrounded, poorly sorted gravel----------	5	65
	Gravel, sandy, poorly sorted, subangular to rounded; electric log shows interbedded clayey lenses----------	80	145
	Sand, medium, moderately well sorted, subangular to rounded; interbedded with calcareous silty clay----------	18	163
	Gravel, sandy----------	11	174
Fort Union Group:			
	Clay, light-olive-gray (locally dusky-yellowish-brown), calcareous, locally lignite----------	26	200

158-99-13ddd

Geological source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Soil, black, silty	1	1
	Till, moderate-yellowish-brown to dark-yellowish-orange, silty, oxidized; electric log indicates a more sandy material from 118 to 145 feet	144	145
	Clay, dusky-yellow to light-olive-gray, silty and sandy, calcareous, oxidized	20	165
	Sand, poorly sorted, subangular to rounded; predominant size about 0.5 millimeter	11	176
	Sand, gravelly, poorly sorted, subangular to rounded, interbedded with grayish-green to pale-yellowish-green clay, locally oxidized; predominant sand size about 1.5 millimeter	27	203
	Silt, pale-olive, clayey, sandy, calcareous	37	240
	Gravel, poorly sorted, angular to rounded, interbedded with olive-gray calcareous silt	8	248
	Gravel, poorly sorted, angular to rounded	11	259
Fort Union Group:			
	Clay, grayish-olive and medium-light-gray, silty and sandy, calcareous, lignitic; lignite fragments cause a salt and pepper appearance-	35	294

158-99-15aaa1

Glacial drift:			
	Soil, silty clay, black	1	1
	Till, silty, light-olive-gray; pockets of iron oxide stained material	17	18
	Boulder, granite	1	19
	Till, silty, light-olive-gray; pockets of iron oxide stained material	22	41
	Till, silty, olive-gray to dark-greenish-gray	36	77
	Gravel, sandy, poorly sorted, subangular to subrounded	3	80
	Till, silty, olive-gray	32	112
	Gravel, clayey	10	122
	Gravel, sandy, poorly sorted, subangular to rounded	11	133
	Clay, olive-gray, sandy, silty, calcareous	2	135
	Gravel, sandy, poorly sorted, angular to subrounded; contains a few clay lenses	53	188
Fort Union Group:			
	Clay, greenish-gray to light-olive-gray; locally silty clay	22	210

158-99-15aaa2

Glacial drift:			
	Soil, black	1	1
	Till, moderate-olive-brown, silty, sandy	5	6
	Till, yellowish-gray, silty, sandy, oxidized; contains thin lenses of fine to coarse sand	47	53
	Till, olive-gray, silty; locally contains small concentrations of rocks	28	81
	Sand, medium to coarse, lignitic, moderately well sorted, subangular to subrounded	5	86
	Till, olive-gray with brownish tint, silty to sandy	21	107
	Sand, medium to very coarse with fine gravel; contains a few clay lenses, samples contained mostly lignite from 147 to 160 feet	53	160

158-100-3aaa
Test hole 1515

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Soil, black	3	3
	Clay, light-gray, sandy	3	6
	Till, yellow to buff; contains considerable gravel	35	41
	Sand, silty, fine to coarse	11	52
	Sand, fine to coarse	11	63
	Gravel, fine to coarse	23	86
	Clay, light-gray to greenish-gray	19	105

158-100-6ddd

Glacial drift:			
	Soil, black, silty and sandy	1	1
	Clay, light-bluish-gray, very calcareous	2	3
	Sand, dark-brown, silty, very fine	2	5
	Till, yellowish-gray to dusky-yellow, sandy, oxidized; contains a few thin sand or gravel lenses	18	23
	Till, olive-gray, silty	22	45
	Sand, medium to very coarse with some fine gravel	45	90
	Clay, olive-gray, silty, plastic	40	130
	Clay, olive-gray, silty, with thin lenses of silt and very fine sand	10	140
	Clay, olive-gray, silty, calcareous	29	169
	Till, olive-gray, silty	39	208
	Sand, fine to medium, moderately well sorted, subrounded	72	280
	Sand, gravelly	10	290
	Till, olive-gray, silty	27	317
Fort Union Group:			
	Silt, olive-gray to olive-black, clayey, light-greenish-gray, fine, clayey, sandstone	13	330
	Sandstone, siltstone, and shale, light-bluish-gray, interbedded	6	336

158-100-7bcb
Test hole 25-776

Glacial drift:			
	Soil, black	1	1
	Gravel, fine to coarse	21	22
	Gravel, sandy, fine to coarse	4	26
	Sand and gravel, lignite abundant	37	63

158-100-8daa1

Glacial drift:			
	Soil, black, silty	2	2
	Till, yellowish-brown, silty, oxidized	21	23
	Till, olive-gray, silty	12	35
	Sand, fine to coarse, with much coal	15	50
	Gravel, fine to coarse, about 25 percent sand	11	61
	Sand, fine to coarse with much coal	11	72
	Gravel, fine to medium, about 25 percent sand with much coal	17	89
	Sand, fine to coarse, about 25 percent fine to medium gravel with much coal	20	109

158-100-8daal--Continued

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift--Continued			
	Gravel, fine to coarse, about 25 percent fine to coarse sand with some coal	2	111
	Clay, olive-gray, silty	11	122
	Gravel, fine to medium, about 25 percent fine to coarse sand	53	175
	Till, olive-gray, silty	7	182
Fort Union Group:			
	Clay, light-bluish-gray, sandy and silty	7	189

158-100-8daa2

Glacial drift:			
	Soil, black, silty	2	2
	Till, yellowish-brown, silty	21	23
	Till, olive-gray, silty	12	35
	Sand, fine to coarse, with much coal	15	50
	Gravel, fine to coarse, about 25 percent sand with much coal	11	61
	Sand, fine to coarse, with much coal	11	72
	Gravel, fine to coarse, about 25 percent sand with much coal	17	89
	Sand, fine to coarse, about 25 percent fine to medium gravel with much coal	5	94

158-100-11ccc

Glacial drift:			
	Soil, black	1	1
	Till, dusky-yellow and light-olive-gray, silty, contains pockets of iron oxide stained material	49	50
	Till, light-olive-gray, dusky-yellow, silty, partly oxidized	6	56
	Till, dark-yellowish-brown, oxidized	4	60
	Till, olive-gray	10	70
	Sand, gravelly, poorly sorted, angular to rounded, locally interbedded with olive-gray, silty clay	35	105
	Sand and silty clay, moderate-yellowish-brown, calcareous, oxidized; interbedded	29	134
	Sand, gravelly, poorly sorted, angular to rounded	25	159
	Clay, olive-gray, silty, calcareous	4	163
	Sand, moderately well sorted, angular to rounded; predominant size about 0.5 millimeter	13	176
	Sand, gravelly, poorly sorted, angular to rounded	11	187
Fort Union Group (?):		23	210

158-100-17abb
Helgeson observation well 6

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Sand, fine to coarse	5	5
	Gravel, fine to medium, about 25 percent fine to coarse sand	8	13
	Till, olive-gray	34	47
	Sand, fine to coarse, about 25 percent fine to medium gravel with coal fragments	5	52
	Gravel, fine to medium, about 25 percent fine to coarse sand with some coal fragments	18	70
	Sand, fine to coarse, with some coal	18	88
	Gravel, fine to coarse, about 25 percent fine to coarse sand with some coal fragments	6	94
	Gravel, fine to coarse with thin olive-gray, clay lenses	8	102
	Gravel, fine to medium, about 25 percent fine to coarse sand with coal	18	120
	Till, olive-gray, silty	16	136

158-100-17abc1
Helgeson observation well 1

	Soil, black, silty and sandy	1	1
	Sand, yellowish-brown, fine to medium, poorly sorted	3	4
	Till, yellowish-brown, very silty and sandy, oxidized	29	33
	Till, dark-olive-gray, silty and sandy	9	42
	Sand and gravel (about 75 percent medium and coarse sand); individual particles are about 30 to 40 percent quartz, and 30 percent limestone, the balance is dark igneous rocks, shale, and lignite	8	50
	Gravel, coarse, subangular to subrounded	15	65
	Gravel, sandy, unsorted; contains many lignite particles near bottom	15	80
Fort Union Group:			
	Clay, light-bluish-gray, silty	4	84

158-100-17abc2
Helgeson observation well 3

Glacial drift:			
	Soil, black, silty and sandy	2	2
	Till, yellowish-brown, silty, oxidized	31	33
	Till, olive-gray, silty	9	42
	Sand, fine to coarse; contains coal fragments	4	46
	Gravel, fine to coarse, about 25 percent fine to coarse sand; contains many coal fragments	5	51
	Sand, fine to coarse, about 25 percent fine to medium gravel; contains some coal fragments	4	55
	Gravel, fine to coarse, about 25 percent fine to medium sand; contains coal fragments	5	60
	Sand, fine to coarse; about 25 percent fine sand; contains coal fragments in layers	5	65
	Clay and coal (core)	0.3	65.3
	Sand, fine to coarse, about 25 percent fine to coarse gravel	2.7	68
	Gravel, fine to coarse, about 25 percent fine to medium sand	5	73
	Sand, fine to coarse, about 25 percent gravel	11	84

158-100-17abc2--Continued
Helgeson observation well 3

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift--Continued:			
	Gravel, fine to coarse, about 25 percent fine to medium sand	3	87
Fort Union Group:			
	Clay, light-bluish-green, silty	7	94

158-100-17abc3
Helgeson observation well 4

	Soil, black, silty and sandy	2	2
	Gravel, fine to medium	2	4
	Till, yellowish-brown, silty	28	32
	Till, olive-gray, silty	11	43
	Gravel, fine to coarse; fine to coarse sand	9	52
	Sand, fine to coarse, about 25 percent fine to medium gravel	12	64
	Sand, fine to coarse; fine to coarse gravel	15	79
	Gravel, fine to coarse, about 25 percent fine to coarse sand	5	84
	Sand, fine to coarse, about 25 percent fine to coarse gravel	5	89
	Gravel, fine to coarse, contains some clay	4	93
Fort Union Group:			
	Clay, light-bluish-green, silty	12	105

158-100-17abd
Helgeson observation well 2

Glacial drift:			
	Clay, silty and sandy	2	2
	Till, yellowish-brown, silty, oxidized	26	28
	Till, olive-gray, silty	12	40
	Gravel, fine to medium; medium to coarse sand	10	50
	Sand, fine to coarse, about 25 percent fine to medium gravel	20	70
Fort Union Group:			
	Clay, light-gray, silty	3	73

158-100-17acb
Helgeson observation well 5

Glacial drift:			
	Soil, black, silty and sandy	3	3
	Till, yellowish-brown, silty, oxidized	19	22
	Till, olive-gray, silty	12	34
	Sand, fine to coarse, about 25 percent fine to medium gravel with coal fragments	20	54
	Gravel, fine to coarse, about 25 percent fine to coarse sand with coal fragments	15	69
Fort Union Group:			
	Clay, light-bluish-gray, silty	1	70

158-100-17ada
Helgeson observation well 7

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Soil, black, silty and sandy----------	1	1
	Till, yellowish-brown, silty, oxidized----------	13	14
	Till, olive-gray, silty----------	16	30
	Sand, fine to coarse with coal fragments--------	15	45
Fort Union Group:			
	Clay, light-bluish-gray, silty and sandy--------	7	52

158-100-19ccc
Test hole 1442

Glacial drift:			
	Clay, light-gray----------	5	5
	Sand, coarse----------	6	11
	Gravel, coarse----------	10	21
	Sand, coarse----------	9	30
	Silt, gray----------	12	42
	Sand, fine to coarse----------	34	76
	Clay, light-gray, calcareous----------	8	84

158-100-26aaa

Glacial drift:			
	Soil, black----------	1	1
	Till, dark-yellowish-orange, oxidized; till is silty in bottom few feet of interval---------	55	56
	Silt, yellowish-gray, clayey, calcareous, oxidized----------	8	64
	Till, dusky-yellow to dark-yellowish-orange, silty, oxidized----------	17	81
	Gravel, sandy, poorly sorted, angular; average size 5 to 7 millimeters; contains a few dark-greenish-gray clay lenses----------	19	100
	Till, olive-gray----------	12	112
	Sand, gravelly, poorly sorted, subrounded to angular, predominant size 0.5 to 1 millimeter	24	136
Fort Union Group:			
	Sand, dusky-yellow, clayey, calcareous----------	8	144
	Clay, dark-greenish-gray; locally contains much lignite----------	13	157

158-101-24dcc
Test hole 1441

Glacial drift:			
	Clay, brown, sandy----------	2	2
	Sand and fine gravel----------	31	33
	Gravel, fine, lignitic----------	8	41
	Sand, coarse----------	11	52
	Gravel, fine to coarse----------	11	63

158-103-1cbc

Geologic source	Material	Thickness (feet)	Depth (feet)
Alluvium:			
	Sand, light-brownish-gray, fine	2	2
	Clay, dark-brownish-gray, sandy	4	6
	Sand, gray, fine, well sorted, subrounded	4	10
	Sand, gray, medium, well sorted, subrounded	4	14
	Sand, light-gray, coarse, well sorted, subangular to subrounded	8	22
	Gravel, medium, moderately well sorted	3	25
	Gravel, fine, moderately well sorted	3	28
	Sand, very coarse	5	33
	Sand, gray, well sorted	5	38
	Silt and very fine sand, slightly clayey	5	43
Fort Union Group:			
	Shale, light to medium-gray, calcareous	6	49
	Lignite, black	2	51
	Shale, light-gray, silty, calcareous	5	56
	Lignite, black	2	58
	Silt and very fine sand, olive-gray to dark-greenish-gray, calcareous	3	61
	Lignite, black	5	66
	Silt, black, carbonaceous	2	68
	Shale, dark-greenish-gray, sandy	3	71
	Shale, greenish-gray; silty shale near bottom of interval	9	80

158-103-14aaa

Glacial drift:			
	Soil, dark-brown, sandy	2	2
	Till, yellow to moderate-olive-brown, very sandy, oxidized	4	6
	Till, very dark-brown, oxidized	3	9
	Till, moderate-olive-brown, sandy, oxidized; contains a few thin sand and gravel lenses	18	27
	Till, moderate-olive-brown, silty, oxidized	7	34
	Till, olive-gray, silty	24	58
Fort Union Group:			
	Sand, dark-greenish-gray, fine, calcareous, lignitic and micaceous	8	66
	Shale, light to medium-gray, silty, calcareous, lignitic	14	80

158-103-25bbc

Glacial drift:			
	Sand, yellowish-gray, gravelly and silty, poorly sorted	13	13
	Till, yellowish-gray and dusky-yellow, silty, oxidized	9	22
	Till, olive-brown to light-olive-gray, silty	12	34
	Till, olive-gray, silty	16	50
	Gravel, sandy, moderately well sorted, subangular to subrounded	8	58
Fort Union Group:			
	Lignite, black	6	64
	Clay, gray to black, silty, carbonaceous	6	70
	Shale, medium-gray	10	80

159-95-14dbc
Test hole 1640

Geologic source	Material	Thickness (feet)	Depth (feet)
	Soil, black	1	1
	Clay, light-gray	10	11
	Gravel, fine and coarse sand	3	14
	Till, dark-gray	92	106
	Gravel, fine to coarse	8	114
	Till, gray	13	127

159-95-15aad
Test hole 1641

Glacial drift:			
	Soil, brown	4	4
	Gravel, fine to coarse	12	16
	Till, gray	174	190
Fort Union Group:			
	Clay, olive-gray, sandy	10	200

159-95-15ccc

Glacial drift:			
	Soil, black, silty	2	2
	Till, dusky-yellow, silty, oxidized	19	21
	Till, olive-gray, silty	33	54
	Till, olive-gray, silty and sandy	155	209
Fort Union Group:			
	Shale, dusky-yellow, very silty, calcareous, oxidized	8	217
	Shale, greenish-gray and olive-gray; contains some thin lignite and carbonaceous clay lenses	23	240

159-95-19aab

Glacial drift:			
	Fill, mostly till	4	4
	Till, dusky-yellow and light-olive-gray, silty, oxidized	16	20
	Till, moderate-olive-brown and light-olive-gray, silty, partly oxidized	19	39
	Clay, varigated yellows and grays and bright rusty-orange, silty, sandy, laminated	16	55
	Till, dusky-yellow to moderate-olive-brown, silty, oxidized	32	87
	Till, olive-gray	97	184
	Gravel, medium	3	187
Fort Union Group:			
	Sand, dark-greenish-yellow, clayey, lignitic, micaceous, oxidized	12	199
	Shale, light-olive-gray to medium-gray	21	220

159-95-22aaa
Test hole 1636

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Soil, black	4	4
	Clay, yellow, fine gravel	8	12
	Gravel, sandy, fine to medium	9	21
	Gravel, medium to coarse	4	25
	Till, gray	121	146
Fort Union Group:			
	Clay, gray, sandy	11	157

159-95-23dad
Test hole 1638

Glacial drift:			
	Soil, black	1	1
	Gravel, medium to coarse	29	30
	Till, gray	12	42

159-95-24aba
Test hole 1647

Glacial drift:			
	Soil, black	1	1
	Clay, light-gray	4	5
	Clay, black, silty	9	14
	Gravel, fine	5	19
	Till, gray	86	105

159-95-26cbb
A. K. Strid

(Log furnished by E. H. Prather)

Clay, brown, rock, gravel	56	56
Clay, gray, rock	23	79
Coal (trace of water)	3	82
Clay, gray, rock, gravel	102	184
Sand, brown, fine, muddy	2	186
Clay, brown	5	191
Clay, gray	13	204
Clay, gray, sandy	4	208
Coal (trace of water)	2	210
Shale, gray	26	236
Clay, gray, sandy	9	245
Shale, gray	10	255
Clay, brown, mixed with coal	13	268
Clay, gray	23	291
Clay, sandy, gray, coarse sand	19	310
Clay, gray	14	324
Coal (water)	1	325

159-96-20ccc

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Soil, black, silty	2	2
	Clay, yellowish-gray, silty, oxidized	4	6
	Sand, yellowish-gray, clayey, oxidized	6	12
	Silt, dusky-yellow, clayey, oxidized; contains a few pebbles	5	17
	Till, moderate-olive-brown, silty	18	35
	Till, olive-gray, silty to sandy	22	57
	Clay, olive-gray, silty, calcareous, laminated	8	65
	Clay, olive-gray, sandy, slightly friable	7	72
	Till, olive-gray, silty	9	81
	Till, moderate-olive-brown, silty to sandy, oxidized	16	97
	Till, light-olive-gray to olive-gray, silty to sandy	13	110
	Till, olive-gray, gravelly	5	115
	Till, olive-gray, silty to sandy	23	138
Fort Union Group:			
	Lignite, black, fissile	7	145
	Shale, medium-gray	20	165
	Lignite, black, fissile (drills as though highly fractured)	15	180

159-96-22ccc

Glacial drift:			
	Fill	4	4
	Clay, black, silty, highly organic	4	8
	Clay (till?), yellowish-gray, silty, calcareous; contains sand grains	7	15
	Till, dusky-yellow to moderate-olive-brown, silty, oxidized	8	23
	Till, olive-gray, silty	39	62
	Till, olive-gray, silty; contains several thin gravel lenses	31	93
	Gravel, clayey, poorly sorted; pebbles are predominantly limestone and granitic rocks	20	113
	Till, olive-gray, rocky	9	122
	Till, olive-gray, silty to sandy	45	167
	Till, olive-gray, silty to sandy, drilling indicates many small rocks	13	180
Fort Union Group:			
	Clay, white to light-greenish-gray, very silty, calcareous	9	189
	Shale, medium-gray, calcareous	11	200

159-96-23baa

Glacial drift:			
	Soil, black, silty	2	2
	Clay, dusky-yellow, silty, oxidized, laminated	15	17
	Clay, light-olive-gray streaked with moderate-olive-brown, silty	7	24
	Sand, fine to medium, well sorted, subrounded	4	28
	Clay, light-olive-gray, silty, laminated	9	37
	Till, olive-gray, silty; till is very cohesive	82	119
	Till, olive-gray, silty, contains lenses of medium to very coarse sand and gravel	18	137
Fort Union Group:			
	Sand, yellowish-green, clayey, moderately well sorted, friable	10	147
	Sand, olive-gray and greenish-gray, clayey, and light to medium-gray shale	23	170

159-96-34bbb
Test hole 1645

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Soil, black	1	1
	Clay, brownish-gray	10	11
	Till, gray to brownish-gray	41	52
	Clay (till?), brown, silty	86	138
Fort Union Group:			
	Clay, light-gray, silty	9	147

159-96-34ccc
Test hole 1644

Glacial drift:			
	Soil, black	3	3
	Clay, yellow to light-brown, fine gravel	26	29
	Till, gray	13	42
	Gravel, fine to medium	4	46
	Till, gray	35	81
	Clay, yellow to light-brown, sandy	15	96
Fort Union Group:			
	Clay, light-gray, sandy	19	115

159-97-2baa
City of Wildrose

(Log furnished by Simpson and Son)

Till, yellowish-gray, weathered	20	20
Till, light-gray to medium-gray	50	70
Sand, light-gray, fine	10	80
Sand, fine to coarse	5	85
Sand, dirty	2	87
Sand, gravelly, fine to coarse	13	100
Till, gray	3	103
Till, gray, gravelly	5	108
Sand and gravel	9	117
Till, gray	2	119

159-97-3ccc

Glacial drift:			
	Silt, dark-yellowish-brown to moderate-yellowish-brown, silty, oxidized	25	25
	Sand, very fine to very coarse, poorly sorted	2	27
	Till, moderate-olive-brown, slightly oxidized	3	30
	Till, dark-greenish-gray	7	37
	Gravel, medium, subrounded; pebbles, predominantly limestone	2	39
	Till, olive-gray, silty	31	70
	Till, moderate to dark-yellowish-brown	15	85
Fort Union Group:			
	Silt, light-olive-brown to dusky-yellow, sandy, calcareous, micaceous, oxidized; contains small fragments of lignite, laminated	22	107
	Sand, dark-greenish to medium-bluish-gray, clayey, calcareous	4	111
	Sandstone, bluish-white, highly calcareous	4	115

159-97-18aad
John Holland

(Log furnished by E. H. Prather)

Geologic source	Material	Thickness (feet)	Depth (feet)
	Cistern	11	11
	Clay, brown	27	38
	Clay, blue, sandy	11	49
	Sand, gray, fine gravel	6	55

159-97-26aaa

Glacial drift:			
	Soil, black, silty	2	2
	Till, yellowish-gray, sandy, oxidized	4	6
	Till, dusky-yellow; silty to sandy, oxidized	13	19
	Clay, light-olive-gray, silty, laminated	5	24
	Sand, fine to coarse, moderately well sorted, iron-oxide stained	13	37
	Till, olive-gray, silty	33	70
	Clay, black, highly carbonaceous	4	74
	Shale, gray to black; contains thin lignite lenses	8	82
	Shale, varicolored with shades of yellow and gray, silty	18	100

159-97-28aaa

Glacial drift:			
	Soil, black, silty, pebbly	2	2
	Till, yellowish-gray, sandy, oxidized	7	9
	Till, dusky-yellow, silty to sandy, oxidized	12	21
Fort Union Group:			
	Shale, varigated yellows and grays	18	39
	Silt, sand, lignite, varigated yellows, greens, and black, apparently interbedded	21	60

157-97-30aaa

Glacial drift:			
	Soil, black, sandy	2	2
	Gravel, sand, poorly sorted, subangular to sub-rounded	7	9
	Till, yellowish-gray to moderate-olive-brown, silty to sandy, oxidized	11	20
	Till, light-olive-gray to olive-gray, silty to sandy, partly oxidized	9	29
	Till, olive-gray	7	36
Fort Union Group:			
	Sand, white, clayey, fine grained, calcareous	4	40
	Shale, yellow and light-olive-gray, silty	14	54
	Lignite, black, fissile	6	60

159-98-10aad

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Soil, black, gravelly----------	2	2
	Clay, dusky-yellow, silty to sandy, oxidized, laminated----------	4	6
	Gravel, fine to medium, moderately well sorted, subangular to subrounded; pebbles are predominantly limestone and granitic rocks-------	9	15
	Till, light-olive-gray to olive-gray, silty------	24	39
	Till, olive-gray, silty to sandy; contains several thin lenses of medium to coarse sand and fine to medium gravel----------	77	116
	Gravel, sandy, subangular to subrounded----------	5	121
	Sand, medium and coarse, well sorted, generally subrounded----------	12	133
	Gravel, sandy, moderately well sorted in lenses; sand is predominantly quartz, gravel is predominantly limestone and granitic rocks-------	6	139
	Till, gravelly (poor samples)----------	12	151
	Till, olive-gray, sandy----------	40	191
	Gravel, sandy, poorly sorted, angular to subrounded; pebbles are predominantly limestone with some granitic, shale, and lignite--------	37	228
Fort Union Group:			
	Lignite, black, fissile----------	8	236
	Shale, medium-gray to black, carbonaceous--------	24	260

159-98-20cbb

Glacial drift:			
	Soil, dark-brown, silty----------	4	4
	Clay, yellowish-gray and dusky-yellow, silty and sandy, oxidized, laminated----------	8	12
	Gravel, sandy, subangular to subrounded; pebbles are predominantly iron-oxide stained granitic rocks and limestone----------	62	74
Fort Union Group:			
	Lignite, black fissile----------	13	87
	Clay, medium-gray to olive-gray, silty and sandy, calcareous, lignitic; with black carbonaceous streaks----------	33	120

159-98-21ddd

Glacial drift:			
	Soil, black----------	2	2
	Till, yellowish-gray, silty to sandy, oxidized--	4	6
	Till, yellowish-gray to dusky-yellow, silty, oxidized----------	4	10
	Gravel, sandy, iron-oxide stained----------	4	14
	Till, moderate-olive-brown, silty, oxidized-----	39	53
	Till, olive-gray, silty----------	38	91
Fort Union Group:			
	Clay, olive-gray, sandy, very calcareous; has H_2S odor----------	8	99
	Sand, dark-greenish-gray with black streaks, clayey, carbonaceous, micaceous----------	10	109
	Clay, medium-gray to olive-gray, sandy----------	11	120

159-98-26aaa

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Soil, black, pebbly----------	1	1
	Till, yellowish-gray to medium-olive-brown, silty to sandy, oxidized----------	28	29
Fort Union Group:			
	Shale, yellow, light-olive-gray and greenish-gray, very silty----------	11	40

159-99-13bcb
Ervin Lohse

(Log furnished by William Weber)

Clay----------	55	55
Sand----------	5	60
Clay----------	16	76
Coal----------	8	84
Clay----------	1	85
Coal----------	1	86

159-99-22ccb

Glacial drift:			
	Sand and gravel, poorly sorted, subrounded to rounded, (drilled as though predominantly sand to 65 feet, drilled like coarse gravel and small boulder to 81 feet)----------	81	81
Fort Union Group:			
	Silt, light-olive, sandy----------	5	86
	Lignite, brownish-black----------	9	95

159-99-24ccb

Glacial drift:			
	Soil, black----------	1	1
	Till, moderate-yellowish-brown to moderate-yellowish-orange, silty, oxidized----------	15	16
	Sand, poorly sorted, angular to rounded---------	8	24
	Gravel, sandy, poorly sorted, angular to rounded; pebbles are predominantly limestone, granitic rocks and lignite----------	7	31
Fort Union Group:			
	Clay, greenish-gray to light-greenish-gray, calcareous; contains thin lenses of lignite--	37	68
	Lignite, brownish-black, clayey----------	6	74

159-99-29aaa
Test hole 1518

Glacial drift:			
	Soil, black----------	3	3
	Gravel and sand----------	29	32
	Clay, yellow to light-brown----------	25	57
	Clay, dark-gray, sandy----------	6	63
	Gravel, fine; coarse sand----------	10	73
	Clay, yellow to dark-brown, sandy----------	16	89
	Clay, light-tan, sandy----------	5	94
Fort Union Group (?):			
	Sand, light-gray and brown, clayey, mottled-----	21	115

159-99-30ddd

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Soil, black	1	1
	Till, light-olive-gray to dusky-yellow, oxidized	19	20
	Till, olive-gray	3	23
	Gravel, sandy, poorly sorted, angular to rounded	5	28
	Silt, light-olive-gray to greenish-gray, clayey, calcareous	5	33
	Sand, clayey, calcareous, poorly sorted; average size about .25 millimeter	8	41
Fort Union Group:			
	Silt, dusky-yellow, clayey, interbedded with lignite	22	63

159-100-1cbb

Glacial drift:			
	Clay, dark-yellowish-brown, sandy, jointed	3	3
	Till, moderate-olive-brown, silty, oxidized, cohesive	26	29
	Till, olive-gray, silty to sandy, contains several thin sand and gravel lenses	226	255
	Gravel, fine to medium, sandy in lenses; pebbles are predominantly limestone, dolomite and siliceous granitic rocks, shale and lignite pebbles occur in minor amounts	27	282
Fort Union Group:			
	Silt, olive-gray to olive-black, clayey, moderately calcareous, crumbly (nonplastic); contains some soft, white, chalky clay	34	316
	Sand, light-greenish-gray, clayey, very fine, calcareous; contains a few indurated sandstone stringers	14	330

159-100-5aaa
Test hole 1522

Glacial drift:			
	Soil, brown	5	5
	Till, light-gray to yellow-buff, mottled, oxidized	11	16
	Till, gray	42	58
	Gravel, fine to coarse	27	85
	Sand, coarse; fine gravel	20	105
	Clay, dark-gray, sandy	52	157
	Gravel, fine to medium	5	162
Fort Union Group:			
	Clay, gray, sandy	6	168

159-100-10bbb

Glacial drift:			
	Soil, dark-brown, gravelly	.5	.5
	Gravel, sandy, fine to coarse	23.5	24
	Till, dusky-yellow, silty, oxidized	4	28
	Till, olive-gray, silty	16	44
	Gravel, sandy, generally subrounded; contains much lignite	29	73
	Sand, fine to coarse	13	86

159-100-10bbb--Continued

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift--Continued:			
	Clay, olive-gray, silty; clayey, very fine sand, interbedded	13	99
	Silt, clay, sand, olive-gray, interbedded	23	122
	Clay, olive-gray to olive-black	12	134
	Gravel, fine to coarse	3	137
Fort Union Group:			
	Clay, light-olive-gray, silty to sandy, calcareous; has strong hydrogen sulfide odor	23	160
	Clay, light-olive-gray, silty to sandy, interbedded with olive-black, calcareous, silty, shale	12	172
	Clay, light-olive-gray, silty, interbedded with greenish-gray shale	13	185
	Sand, light-greenish-gray, clayey, fine to medium, calcareous	15	200

159-100-16bbb
Test hole 1521

Glacial drift:			
	Soil, brown, sandy	4	4
	Gravel, fine to medium	17	21
	Gravel, sandy	30	51
	Gravel, fine; drills as though cemented	14	65
	Gravel, fine, contains much lignite	19	84
	Sand, coarse	6	90
	Clay, gray (poor sample)	4	94

159-100-23aaa

Glacial drift:			
	Soil, black	1	1
	Till, light-olive-gray to dusky-yellow, silty, oxidized	38	39
	Gravel, sandy, poorly sorted, angular to rounded	30	69
	Till, light-olive-gray to dark-yellowish-brown, oxidized	5	74
	Till, dark-greenish-gray	83	157
	Clay, olive-gray to dark-greenish-gray, calcareous	11	168
	Till, dark-greenish-gray	9	177
	Gravel, sandy and clayey, poorly sorted, angular to rounded	10	187
	Gravel, angular to rounded	46	233
	Till, olive-gray to dark-greenish-gray, silty to sandy	46	279
	Till, olive-gray	14	293
	Clay, light-olive-gray to dark-greenish-gray, calcareous, locally sandy	11	304
	Till, olive-gray, gravelly	64	368
Fort Union Group:			
	Clay, light-bluish-gray to brownish-black, sandy	10	378

159-100-28add

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Gravel, sandy, angular to well rounded; contains a thin olive-gray silt lense at about 60 feet and probably from 80 to 82 feet	97	97
	Sand, very fine to very coarse	20	117
	Silt, lignitic, calcareous	15	132
	Silt, olive-gray, clayey, calcareous; contains some very fine sand laminae and black carbonaceous spots	43	175
	Sand, olive to dark-greenish-gray, clayey, calcareous, lignitic	7	182
	Silt, olive-gray, clayey, calcareous; contains black carbonaceous spots	28	210
	Till, olive-gray	50	260
	Till, olive-gray, gravelly	25	285
	Silt, olive-gray, calcareous	36	321
	Sand, silty, very fine (poor samples)	17	338
	Till, olive-gray (poor samples)	4	342
	Gravel, sandy, subangular to well-rounded; pebbles predominantly limestone and brown pebbles (weathered chert?)	11	353
Fort Union Group:			
	Lignite and lignitic clay	9	362
	Clay, greenish-gray, silty, micaceous	13	375

159-100-28bbc
Test hole 1516

Glacial drift:			
	Soil, black	4	4
	Sand, fine to medium, dirty	6	10
	Sand, fine to coarse	11	21
	Sand, fine to coarse; contains some fine gravel	20	41
	Sand, gravelly	64	105

159-101-1aac
U.S. Bureau of Reclamation test hole AH-20

	Clay, brownish-gray	18	18
	Clay, gray, pebbly	13	31
Fort Union Group:			
	Clay, gray to light-gray	13	44

159-101-11dcd
U.S. Bureau of Reclamation test hole AH-17

	Clay, brownish-gray, pebbly	26	26
	Clay, brownish-gray	14	40

159-101-18bcb
U.S. Bureau of Reclamation test hole 10

Fort Union Group:			
	Clay, grayish-yellow, sandy	39	39
	Clay, light-brown, silty, hard	13	52
	Clay, gray, sandy, hard	9	61

159-101-20bda
U.S. Bureau of Reclamation test hole AH-12

Geologic source	Material	Thickness (feet)	Depth (feet)
	Clay, gray, pebbly	14	14
	Clay, light-brown, sandy	9	23

159-101-22abc
U.S. Bureau of Reclamation test hole AH-15

	Clay, buff, sandy	5	5
	Sand, buff, fine	5	10
	Clay, buff to grayish-buff	8	18
	Clay, grayish-buff, flaky, contains a trace of pebbles	42	60

159-101-22bbc
U.S. Bureau of Reclamation test hole AH-14

	Clay, yellow	3	3
	Sand, fine	2	5
	Clay and sand, gray, interbedded	10	15
Fort Union Group:			
	Lignite	9	24
	Sand, light-gray; contains about 20 percent clay	4	28

159-101-26aac
Nels Hanson

(Log furnished by Mr. Burton)

	Sand and gravel	40	40
	Shale, gray	15	55
	Shale, gray, lenses of coal	12	67

159-101-26abc

Glacial drift:			
	Silt, dark-yellowish-brown, clayey, calcareous, oxidized	20	20
	Gravel, sandy, poorly sorted, rounded, oxidized	20	40
	Sand, poorly sorted	14	54
	Till, olive-gray, silty	56	110
	Silt, greenish-gray to dark-greenish gray, sandy, contains some lignite	50	160
Fort Union Group:			
	Sand, dark-yellowish-orange, clayey, very fine to medium, calcareous, oxidized; contains some lignitic silt	10	170
	Sandstone, light-bluish-gray, calcareous, cemented	5	175
	Sand, dark-yellowish-orange, clayey, very fine to medium	40	215

159-102-7dab
U.S. Bureau of Reclamation test hole AH-2

Geologic source	Material	Thickness (feet)	Depth (feet)
	Clay, dark-gray to black	10	10
	Sand, light-brown, gravelly, coarse to medium, contains about 40 percent pebbles	29	39
Fort Union Group:			
	Clay, gray	3	42

159-102-8cbb
U.S. Bureau of Reclamation test hole AH-3

	Soil, sandy	5	5
	Sand, light-brown, gravelly, coarse to fine, stratified	20	25
	Till, gray	17	42
Fort Union Group:			
	Clay, silty, stratified	12	54

159-102-8cda
U.S. Bureau of Reclamation test hole 3

	Clay, yellowish-brown, silty	5	5
	Sand and gravelly sand, yellowish-brown to brown; sand is medium to coarse, gravel is 1 inch and finer	46	51
Fort Union Group:			
	Clay, gray, silty	7	58

159-102-12ccc
U.S. Bureau of Reclamation test hole 9

	Clay, yellowish-gray	16	16
	Sand, light-brown, gravelly, fine to medium, gravel as much as 30 percent of sample	30	46
Fort Union Group:			
	Clay, light-gray	7	53
	Lignite	1	54
	Clay, light-gray	6	60
	Lignite	2	62
	Clay, light-gray	26	88

159-102-20cba
L. L. Larson

(Log furnished by E. H. Prather)

Fill	3	3
Clay, gray, sandy	22	25
Sand, gray (seep of water)	10	35
Clay, gray	33	68
Clay; contains rocks	7	75
Clay, gray, sandy	120	195
Clay, brown, sandy	17	212
Clay, gray	19	231
Gravel (water)	4	235
Clay, gray	4	239

159-102-29bcb
H. H. Garaas

(Log furnished by E. H. Prather)

Geologic source	Material	Thickness (feet)	Depth (feet)
	Fill----------	2	2
	Shale, brown, sandy----------	18	20
	Sandstone, yellow----------	16	36
	Sand, gravel; seep of water----------	6	42
	Shale, brown, sandy----------	158	200
	Silt, gray, sandy (water)----------	25	225
	Clay, light-gray----------	15	240
	Sand, coal----------	20	260
	Sand, gray (water)----------	10	270
	Shale, green----------	11	281
	Shale, gray, coal----------	14	295
	Silt, gray, sandy----------	5	300
	Sand, gray (water)----------	10	310
	Silt, sandy----------	35	345

159-103-6ddd

Glacial drift:			
	Soil, black, sandy and gravelly----------	1	1
	Clay, light-olive-gray, sandy----------	4	5
	Till, moderate-olive-brown, silty to sandy, oxidized----------	31	36
	Sand, olive-gray, clayey, fine to medium, calcareous----------	8	44
	Sand, fine to medium----------	50	94
	Sand, fine to coarse; contains thin clay layers-	5	99
	Silt, olive-gray, clayey, carbonaceous; contains thin very fine sand and dark carbonaceous laminae----------	41	140
	Gravel, fine to coarse, moderately sorted, subangular to subrounded----------	26	166
	Clay, olive-gray, very sandy, calcareous--------	24	190
	Till, olive-gray, silty----------	20	210
	Clay, olive-gray, silty; contains thin lenses of very fine sand----------	78	288
	Clay, dark-greenish-gray, sandy, calcareous, slightly micaceous; had strong hydrogen sulfide odor----------	12	300
	Gravel, dark-brown, fine to coarse, generally subrounded; pebbles are predominantly chert and iron-oxide stained limestone----------	20	320
Fort Union Group:			
	Shale, light-olive-gray, silty to sandy; contains some lignite----------	26	346

159-103-10bbb

Glacial drift:			
	Gravel, poorly sorted----------	10	10
	Till, moderate to dark-yellowish-brown----------	35	45
	Sand, moderate-yellowish-brown, poorly sorted, oxidized; maximum size about 0.5 millimeter--	53	98
	Till, olive-gray----------	10	108
	Sand, fine to medium; olive-gray, silty clay, interbedded----------	30	138
	Till, olive-gray----------	25	163

159-103-10bbb--Continued

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift--Continued:			
	Gravel	2	165
	Silt, olive-gray, sandy, calcareous, pyritic	29	194
	Sand, very coarse, subangular to rounded; apparently contains some interbedded silt	14	208
	Till, olive-gray, silty	27	235
	Gravel, brown, sandy, rounded to well rounded	17	252
Fort Union Group:			
	Silt, yellowish-gray, light-gray to olive-gray, greenish-gray, lignite, interbedded	23	275

159-103-12acc

Glacial drift:			
	Clay, moderate-olive-brown, silty	6	6
	Gravel, fine to coarse, poorly sorted, subangular to subrounded; predominantly limestone and granitic rocks	16	22
	Till, olive-gray, silty, contains a few oxidized streaks	60	82
	Boulder, granite	2	84
	Till, olive-gray, silty	30	114
	Sand, clayey, fine to very fine, interbedded with silt	45	159
	Silt, sandy (samples remained suspended in drilling mud)	55	214
	Gravel, sandy, poorly sorted, generally subrounded, predominantly quartz, limestone, and shale pebbles, a few brown coated pebbles	5	219
Fort Union Group:			
	Shale, gray and black	3	222
	Lignite, black (drilled as though there is some interbedded shale)	18	240

159-103-12ccc

Glacial drift:			
	Sand, yellowish-gray, clayey; contains some pebbles	5	5
	Till, dusky-yellow to moderate-olive-brown, silty to sandy, oxidized, contains a few lenses of very fine sand	36	41
	Till, olive-gray	6	47
	Gravel, sandy, fine to coarse, well sorted within lenses	20	67
	Till, olive-gray, silty and gravelly	10	77
	Till, olive-gray, silty	26	103
	Sand, gravelly, poorly sorted	12	115
Fort Union Group:			
	Silt and sandy clay, medium-gray, had hydrogen sulfide odor; contains some black carbonaceous clay	25	140

159-103-13cbc
U.S. Bureau of Reclamation test hole 6P

Geologic source	Material	Thickness (feet)	Depth (feet)
Glacial drift:			
	Till, yellowish-brown, pebbly----------	50	50
	Sand, gravelly; contains about 15 percent granitic and metamorphic pebbles----------	8	58

159-103-14bab
U.S. Bureau of Reclamation test hole B

	Clay, yellowish-gray, pebbly----------	15	15
	Clay, gray, pebbly----------	32	47
	Sand, fine and very fine----------	13	60
	Clay, gray, silty----------	35	95
	Clay, gray, pebbly----------	15	110
	Silt, gray, clayey----------	2	112

159-103-23add

Glacial drift:			
	Clay, yellowish-gray, sandy, oxidized----------	5	5
	Till, dusky-yellow, silty, oxidized----------	34	39
	Till, olive-gray, silty----------	15	54
	Silty, dusky-yellow to moderate-olive-brown, clayey, oxidized, laminated, contains some sand----------	15	69
	Till, olive-gray, silty to sandy, contains a few thin sand and gravel lenses----------	66	135
Fort Union Group:			
	Clay, white to light-greenish-gray, silty, calcareous----------	14	149
	Shale, greenish-gray----------	11	160

159-103-25ccc

Glacial drift:			
	Soil, brown, sandy----------	2	2
	Till, yellowish-gray, silty to sandy, oxidized--	30	32
	Sand, brown, fine to medium, poorly sorted; locally silty and clayey----------	15	47
	Till, moderate-olive-brown, silty----------	23	70
	Till, moderate-olive-brown to light-olive-gray, silty and sandy----------	32	102
	Till, olive-gray, silty----------	19	121
Fort Union Group:			
	Silt and clayey fine sand, dusky-yellow, calcareous, oxidized----------	9	130
	Shale, varigated grays and greens, with black, carbonaceous shale----------	10	140

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

Depth to water in feet below land surface

152-103-7ddd

Date	Water level	Date	Water level	Date	Water level	Date	Water level
1965		1965		1966		1966	
July 15	4.09	Oct. 5	5.66	Jan. 6	7.08	Apr. 19	7.56
Aug. 10	4.13	Nov. 10	6.18	Feb. 3	7.44	May 18	4.58
Sept. 12	5.23	Dec. 6	6.63	Mar. 17	7.58	June 21	4.06
						July 15	4.42

152-103-8bbb

1965		1965		1966		1966	
June 9	37.80	Oct. 5	38.36	Jan. 6	39.34	May 18	38.36
July 15	37.50	Nov. 10	38.74	Feb. 3	39.46	June 21	37.87
Aug. 10	37.56	Dec. 6	39.00	Mar. 17	36.69	July 15	37.85
Sept. 12	38.10			Apr. 19	39.74		

152-104-1ddd

1965		1965		1966		1966	
June 9	67.42	Oct. 5	66.87	Jan. 6	67.46	May 18	67.26
July 15	66.95	Nov. 10	67.19	Feb. 3	67.52	June 21	66.83
Aug. 10	66.50	Dec. 6	67.22	Mar. 17	67.67	July 15	67.67
Sept. 12	67.02			Apr. 17	67.78		

152-104-11add

1965		1965		1966		1966	
July 15	63.73	Oct. 5	64.38	Jan. 6	64.87	Apr. 19	65.01
Aug. 10	63.93	Nov. 10	64.81	Feb. 3	64.88	May 18	64.64
Sept. 12	64.44	Dec. 6	64.68	Mar. 17	64.98	June 21	64.43
						July 14	64.33

153-102-13ddd
Corps of Engineers observation well 3-1
Data from 1953-1956 obtained from Corps of Engineers

1953		1954		1955		1964	
Mar. 18	12.71	June 6	13.11	Oct. 7	10.80	Nov. 18	10.54
Apr. 1	12.69	July 1	11.12	Nov. 4	9.78	Dec. 9	10.94
May 6	13.00	Aug. 1	10.73	1956		1965	
June 1	13.08	Sept. 5	11.00	Apr. 1	12.14	Jan. 22	11.26
July 12	12.42	Oct. 3	11.47	May 3	12.24	June 9	10.09
Aug. 2	12.18	Nov. 7	11.77	June 1	11.86	July 15	8.55
Sept. 5	11.63	Dec. 5	12.32	July 4	9.27	Aug. 10	7.96
Oct. 3	10.99	1955		Aug. 1	9.46	Sept. 10	7.94
Nov. 1	10.08	Apr. 1	12.79	Sept. 5	9.93	Oct. 5	8.19
Dec. 6	11.72	May 5	12.80	Oct. 3	10.44	Nov. 10	8.39
1954		June 3	12.42	Nov. 7	10.74	Dec. 6	8.39
Mar. 30	11.92	July 1	9.52	Dec. 1	11.30	1966	
Apr. 1	12.00	Aug. 5	9.82	1964		Apr. 19	8.94
May 2	12.42	Sept. 2	10.39	Oct. 20	10.42	June 21	8.42
						July 15	7.42

Depth to water in feet below land surface

153-102-16ddd
Corps of Engineers observation well 3-3
Data from 1953-1956 obtained from Corps of Engineers

Date	Water level	Date	Water level	Date	Water level	Date	Water level
1953		1954		1956		1965	
Mar. 18	11.23	Sept. 5	9.10	July 4	7.71	Mar. 18	9.04
Apr. 1	11.19	Oct. 3	9.55	Aug. 1	5.84	Apr. 28	6.21
May 6	11.08	Nov. 7	10.07	Sept. 5	7.42	May 20	5.35
June 1	10.34	Dec. 5	10.32	Oct. 3	7.51	June 9	2.80
July 12	9.70	1955		Nov. 7	9.19	July 15	4.87
Aug. 2	7.73	Apr. 1	10.70	Dec. 1	10.09	Aug. 10	5.73
Sept. 5	7.02	May 5	10.06	1964		Sept. 12	6.46
Oct. 3	7.00	June 3	9.48	Apr. 14	10.21	Oct. 5	7.68
Nov. 1	7.08	July 1	8.09	May 12	7.38	Nov. 10	8.02
Dec. 6	9.83	Aug. 5	7.81	June 11	4.33	Dec. 6	8.29
1954		Sept. 2	9.52	July 8.	5.68	1966	
Mar. 30	9.88	Oct. 7	7.11	Aug. 11	6.30	Jan. 6	8.25
Apr. 1	9.91	Nov. 4	9.24	Sept. 2	6.62	Feb. 3	8.04
May 2	8.95	1956		Oct. 6	4.87	Mar. 17	8.13
June 6	8.65	Apr. 1	10.57	Nov. 18	3.00	Apr. 19	7.82
July 1	7.51	May 3	10.65	Dec. 9	7.93	May 18	6.74
Aug. 1	8.98	June 1	4.38	1965		June 21	3.89
				Jan. 22	8.86	July 15	4.61
				Feb. 19	9.02		

153-102-17ccc

1965		1965		1966		1966	
June 9	49.62	Oct. 5	50.05	Jan. 6	49.93	May 18	49.67
July 15	47.02	Nov. 10	50.54	Feb. 3	49.53	June 21	47.96
Aug. 10	49.12	Dec. 6	49.57	Mar. 17	49.19	July 15	49.41
Sept. 12	49.54			Apr. 19	50.10		

153-103-25dad

1965		1965		1966		1966	
June 9	32.19	Oct. 5	33.45	Jan. 6	34.85	May 18	33.58
July 15	31.67	Nov. 10	33.98	Feb. 3	35.03	June 21	32.66
Aug. 10	31.91	Dec. 6	36.27	Mar. 17	34.90	July 15	33.06
Sept. 12	33.04			Apr. 19	34.83		

154-96-8bab

1965		1966		1966		1966	
Oct. 4	42.79	Feb. 3	41.88	Mar. 25	41.59	May 25	41.16
Nov. 10	42.45	Feb. 5	41.84	Mar. 30	41.50	May 30	41.10
Dec. 6	42.25	Feb. 10	41.85	Apr. 5	41.51	June 5	41.05
Dec. 10	42.23	Feb. 15	41.86	Apr. 10	41.43	June 10	41.02
Dec. 15	42.21	Feb. 20	41.85	Apr. 20	41.36	June 15	40.96
Dec. 20	42.15	Feb. 25	41.76	Apr. 25	41.35	June 20	40.87
Dec. 25	41.14	Feb. 28	41.75	Apr. 30	41.37	June 25	40.86
Dec. 30	41.11	Mar. 5	41.80	May 5	41.31	June 30	40.79
1966		Mar. 10	41.75	May 10	41.23	July 5	40.74
Jan. 5	41.20	Mar. 15	41.73	May 15	41.21	July 10	40.71
Jan. 6	42.02	Mar. 20	41.72	May 20	41.14	July 15	40.67
						July 18	40.63

Depth to water in feet below land surface

154-97-12bbb

Date	Water level	Date	Water level	Date	Water level	Date	Water level
1965		1966		1966		1966	
Oct. 4	63.24	Jan. 6	62.57	Mar. 9	62.53	May 19	61.93
Nov. 10	62.87	Feb. 3	62.48	Apr. 19	62.15	June 20	61.36
Dec. 6	62.74					July 18	61.25

154-98-11dbb

1964		1964		1965		1965	
June 24	122.46	Sept. 2	122.50	Jan. 22	122.16	Aug. 10	122.60
July 7	122.65	Oct. 6	123.46	June 10	122.82	Sept. 13	122.05
Aug. 26	122.40	Nov. 19	121.72	July 14	122.20	Well plugged	
		Dec. 9	122.51				

155-97-2aaa

1965		1965		1966		1966	
June 10	66.20	Oct. 7	65.76	Jan. 6	66.63	May 19	65.59
Aug. 10	65.89	Nov. 10	65.72	Mar. 17	65.62	June 20	65.58
Sept. 13	65.81	Dec. 6	65.68	Apr. 20	65.61	July 16	65.57

155-98-28ddd

1964		1964		1965		1966	
June 22	63.17	Nov. 18	62.60	Aug. 10	61.43	Apr. 19	59.82
July 7	63.23	Dec. 9	62.71	Sept. 13	61.19	May 19	59.30
Aug. 12	62.73	1965		Oct. 7	60.79	June 20	59.60
Sept. 2	63.05	June 10	62.36	Nov. 10	60.64	July 18	59.77
Oct. 6	63.07	July 14	62.50	Dec. 7	60.39		

155-99-18aac

1964		1965		1965		1966	
July 7	33.87	Jan. 22	34.31	July 14	30.88	Jan. 6	32.27
Aug. 12	33.85	Feb. 19	34.33	Aug. 10	31.20	Feb. 3	32.48
Sept. 2	33.75	Mar. 18	34.49	Sept. 13	31.51	Mar. 17	32.58
Oct. 6	33.89	Apr. 28	33.22	Oct. 7	31.57	Apr. 19	33.74
Nov. 18	34.14	May 20	33.28	Nov. 10	31.91	May 19	32.86
Dec. 9	34.06	June 9	32.25	Dec. 6	32.12	June 21	33.02
						July 18	33.95

155-100-9ccd

1964		1965		1965		1966	
July 21	47.67	June 9	47.34	Nov. 10	47.69	May 19	47.04
Aug. 12	47.93	July 14	47.17	Dec. 7	47.27	June 21	47.19
Sept. 2	47.97	Aug. 10	47.27	1966		July 18	47.38
Oct. 6	47.98	Sept. 13	47.30	Mar. 17	47.48		
Nov. 16	47.92	Oct. 7	47.25	Apr. 19	47.06		

155-101-24cdc

1964		1964		1965		1966	
May 12	22.54	Oct. 6	22.51	Aug. 10	18.10	Mar. 17	18.89
June 11	22.59	Nov. 18	22.30	Sept. 13	19.07	Apr. 19	19.57
July 9	22.54	Dec. 9	22.55	Oct. 7	19.36	May 19	18.73
Aug. 12	22.41	1965		Nov. 10	18.77	June 21	19.09
Sept. 2	22.26	June 9	20.40	Dec. 7	18.53	July 18	19.02
		July 14	18.67				

Depth to water in feet below land surface

156-95-36bbb

Date	Water level	Date	Water level	Date	Water level	Date	Water level
1964		1964		1965		1966	
July 3	9.09	Dec. 8	10.46	Oct. 7	5.46	Feb. 3	6.39
Aug. 12	7.80	1965		Nov. 10	5.63	Mar. 17	6.42
Sept. 2	8.38	June 10	3.26	Dec. 6	6.57	Apr. 20	9.14
Oct. 6	9.32	July 14	3.88	1966		May 19	7.93
Nov. 19	9.02	Aug. 10	5.08	Jan. 6	6.33	June 20	5.74
		Sept. 13	5.65			July 19	4.71

156-97-9adc

1964		1965		1965		1966	
July 7	76.55	Jan. 22	77.14	Aug. 23	74.92	Feb. 3	74.23
Aug. 12	77.45	Feb. 19	76.81	Sept. 13	74.73	Mar. 16	74.72
Sept. 2	76.36	Mar. 18	77.59	Oct. 7	74.55	Apr. 20	75.18
Oct. 6	76.54	Apr. 28	76.97	Nov. 10	75.55	May 20	76.08
Nov. 19	76.69	May 20	76.64	Dec. 6	74.58	June 20	73.83
Dec. 9	76.30	June 10	75.85	1966		July 16	76.82
		July 14	75.38	Jan. 6	74.35		

156-97-27aaa

1964		1965		1965		1966	
July 7	110.63	June 10	110.68	Oct. 7	110.02	Feb. 3	110.21
Aug. 12	110.73	July 14	110.51	Nov. 10	110.07	Mar. 17	109.76
Sept. 2	110.34	Aug. 10	110.16	Dec. 6	110.26	Apr. 20	109.90
Oct. 6	110.38	Sept. 13	110.35	1966		May 19	109.61
Nov. 19	109.92			Jan. 6	110.09	June 20	109.87
Dec. 8	110.06					July 16	109.96

157-96-11cdc

1963		1965		1965		1966	
Sept. 2	4.00	June 10	4.86	Nov. 8	5.62	May 19	8.39
1964		July 14	4.26	Dec. 6	6.26	June 20	6.89
Sept. 1	10.94	Aug. 10	4.30	1966		July 19	5.76
Oct. 6	11.74	Oct. 7	4.65	Apr. 20	9.99		

157-97-3bbb

1965		1965		1966		1966	
June 11	96.34	Oct. 7	96.50	Jan. 5	96.34	May 12	96.37
July 14	96.94	Nov. 10	96.55	Feb. 2	96.37	June 20	96.26
Aug. 11	96.70	Dec. 7	96.43	Mar. 16	96.35	July 16	96.28
Sept. 13	96.67			Apr. 22	96.33		

157-97-3ddd

1965		1965		1966		1966	
June 11	98.83	Oct. 7	98.90	Jan. 5	98.79	May 12	98.85
July 14	99.12	Nov. 10	99.02	Feb. 2	98.33	June 20	98.75
Aug. 11	99.11	Dec. 7	98.63	Mar. 16	98.61	July 16	98.80
Sept. 13	99.11			Apr. 22	98.76		

Depth to water in feet below land surface

157-97-14ccc

Date	Water level	Date	Water level	Date	Water level	Date	Water level
1965		1965		1966		1966	
June 10	142.81	Oct. 7	142.87	Jan. 5	142.59	May 12	143.00
July 14	143.19	Nov. 10	143.11	Feb. 2	142.98	June 20	142.80
Aug. 11	143.10	Dec. 7	142.94	Mar. 16	142.27	July 16	142.85
Sept. 13	143.21			Apr. 22	142.88		

157-97-36ccc

1965		1965		1966		1966	
Jan. 22	118.84	Sept. 13	136.65	Jan. 6	133.13	May 12	132.44
June 10	136.80	Oct. 7	135.88	Mar. 16	133.29	June 20	131.83
July 14	137.37	Nov. 10	134.18	Apr. 22	133.42	July 16	132.05
Aug. 11	137.37	Dec. 7	132.79				

158-97-19aaa

1965		1965		1966		1966	
July 14	75.59	Nov. 10	76.34	Feb. 2	76.07	May 12	76.10
Aug. 11	76.54	Dec. 7	76.20	Mar. 16	75.92	June 20	76.01
Sept. 13	76.47	1966		Apr. 22	76.06	July 16	76.01
Oct. 7	76.29	Jan. 5	76.07				

158-97-33bbb

1965		1965		1966		1966	
July 14	70.16	Nov. 10	70.02	Feb. 2	69.88	May 12	69.81
Aug. 11	70.20	Dec. 7	69.89	Mar. 16	69.66	June 20	69.73
Sept. 13	70.14	1966		Mar. 22	69.76	July 16	69.74
Oct. 7	69.97	Jan. 5	69.82	Apr. 2	69.79		

158-98-4ccc

1965		1965		1966		1966	
July 13	65.10	Nov. 8	65.21	Feb. 2	65.05	May 12	64.03
Aug. 11	65.12	Dec. 7	64.98	Mar. 16	64.86	June 20	64.92
Sept. 8	64.92	1966		Apr. 22	64.87	July 16	64.94
Oct. 7	65.01	Jan. 5	65.00				

158-98-7ddd

1965		1965		1966		1966	
July 13	121.14	Nov. 8	121.13	Feb. 2	120.96	May 12	120.94
Aug. 11	121.07	Dec. 7	120.94	Mar. 16	120.93	June 20	120.59
Sept. 8	121.04	1966		Apr. 22	120.87	July 16	120.80
Oct. 7	120.84	Jan. 5	120.94				

158-98-13ccb

1965		1965		1966		1966	
July 14	57.85	Nov. 10	56.92	Feb. 2	56.48	May 12	56.36
Aug. 11	57.64	Dec. 7	56.69	Mar. 16	56.30	June 20	56.28
Sept. 13	57.27	1966		Apr. 22	56.38	July 16	56.27
Oct. 7	56.98	Jan. 5	56.52				

Depth to water in feet below land surface

158-99-7ddd

Date	Water level	Date	Water level	Date	Water level	Date	Water level
1965		1965		1966		1966	
July 13	75.80	Nov. 8	75.82	Feb. 2	75.80	May 12	75.74
Aug. 11	75.84	Dec. 7	75.88	Mar. 16	75.62	June 20	75.68
Sept. 8	75.70	1966		Apr. 22	75.76	July 16	75.68
Oct. 7	75.87	Jan. 5	75.89				

158-99-13ddd

1965		1965		1966		1966	
July 13	145.95	Nov. 8	146.09	Feb. 2	145.88	May 12	145.91
Aug. 11	145.93	Dec. 7	145.83	Mar. 16	145.87	June 20	145.66
Sept. 8	145.84	1966		Apr. 22	145.79	July 16	145.70
Oct. 7	145.69	Jan. 5	145.87				

158-99-15aaa1

1965		1965		1966		1966	
July 13	50.63	Oct. 7	50.30	Feb. 2	50.50	May 12	50.55
Aug. 11	50.53	Nov. 8	50.44	Mar. 16	50.30	June 20	50.35
Sept. 8	50.60	Dec. 7	50.49	Apr. 22	50.46	July 16	50.41
Sept. 9	50.47						

158-99-15aaa2

1965		1966		1966		1966	
Oct. 7	49.55	Feb. 2	49.82	Apr. 22	49.72	June 20	49.57
Nov. 8	49.99	Mar. 16	49.55	May 12	49.80	July 16	49.62
Dec. 7	49.79						

158-100-6ddd

1964		1964		1965		1966	
July 9	+0.37	Nov. 18	+1.87	Mar. 17	+1.65	Mar. 16	+0.30
Aug. 13	+0.17	Dec. 8	+1.81	July 13	+1.82	Apr. 22	+1.42
Sept. 3	+0.06	1965		Aug. 11	+1.58	May 12	+1.34
Oct. 6	+0.04	Jan. 21	+1.71	Oct. 6	+1.56	June 21	+1.51
Added 10 gal. of diesel fuel		Feb. 18	+1.66				

158-100-26aaa

1965		1965		1966		1966	
July 13	117.85	Oct. 7	118.67	Jan. 5	119.05	May 12	119.38
Aug. 11	118.52	Nov. 8	118.87	Mar. 16	119.30	June 20	119.38
Sept. 8	118.59	Dec. 7	118.99	Apr. 22	119.35	July 16	119.23

158-103-1cbc

1965		1965		1966		1966	
Oct. 8	6.27	Dec. 7	6.44	Jan. 5	6.47	Mar. 16	6.14
Nov. 8	6.36					Well plugged	

Depth to water in feet below land surface

159-98-10aad

Date	Water level	Date	Water level	Date	Water level	Date	Water level
1965		1965		1966		1966	
Oct. 7	156.50	Dec. 7	153.57	Feb. 2	153.61	May 12	153.48
Nov. 8	153.81	1966		Mar. 16	153.63	June 20	153.56
		Jan. 5	153.59	Apr. 22	153.08	July 16	153.60

159-98-20cbb

1965		1965		1966		1966	
Oct. 7	52.92	Dec. 7	52.92	Feb. 2	52.85	May 18	52.83
Nov. 8	52.98	1966		Mar. 16	53.65	June 20	52.80
		Jan. 5	52.90	Apr. 22	52.81	July 16	52.77

159-100-28add

1963		1964		1965		1965	
Nov. 12	21.59	July 9	21.49	Mar. 17	21.65	Dec. 7	19.95
Dec. 17	21.64	Aug. 13	21.41	Apr. 28	21.43	1966	
1964		Sept. 3	21.44	May 20	21.42	Jan. 5	19.94
Jan. 14	21.65	Oct. 7	21.52	June 22	20.36	Feb. 2	20.04
Feb. 12	21.72	Nov. 18	21.67	July 13	19.98	Mar. 16	19.99
Mar. 11	21.73	Dec. 12	21.06	Aug. 11	19.67	Apr. 22	19.84
Apr. 13	21.57	1965		Sept. 8	19.72	May 18	19.86
May 12	21.49	Jan. 21	21.58	Oct. 6	19.75	June 21	19.99
June 11	21.50	Feb. 18	21.62	Nov. 8	19.88	July 16	22.10

159-101-26abc

1963		1964		1965		1965	
Nov. 12	17.31	July 9	16.92	Mar. 17	17.15	Dec. 7	15.55
Dec. 17	17.37	Aug. 13	15.75	Apr. 28	16.96	1966	
1964		Sept. 3	16.69	May 20	16.82	Jan. 5	15.62
Jan. 14	17.38	Oct. 7	16.86	June 22	15.14	Feb. 2	15.66
Feb. 12	17.48	Nov. 18	16.94	July 13	15.13	Mar. 16	15.67
Mar. 11	17.52	Dec. 18	16.97	Aug. 11	15.20	Apr. 22	15.48
Apr. 13	17.33	1965		Sept. 9	15.36	May 18	15.39
May 12	17.23	Jan. 21	17.07	Oct. 6	15.35	June 21	15.38
June 11	17.00			Nov. 8	15.50	July 16	15.37

159-103-6ddd

1964		1965		1965		1966	
July 9	24.60	Jan. 21	24.54	Aug. 11	23.96	Feb. 2	23.63
Aug. 13	24.71	Feb. 18	24.54	Sept. 9	23.92	Mar. 16	23.62
Sept. 3	24.71	Mar. 17	24.51	Oct. 6	23.84	Apr. 22	23.73
Oct. 7	24.77	Apr. 28	24.60	Nov. 8	23.91	May 18	23.71
Nov. 18	24.80	May 20	24.58	Dec. 7	23.84	June 21	23.94
Dec. 8	24.67	June 22	24.01	1966		July 16	23.99
		July 13	23.92	Jan. 5	23.75		

Depth to water in feet below land surface

159-103-10bbb

Date	Water level	Date	Water level	Date	Water level	Date	Water level
1963		1964		1965		1965	
Nov. 12	37.69	July 11	36.99	Mar. 17	36.99	Dec. 7	36.87
Dec. 17	37.66	Aug. 13	36.95	Apr. 28	36.99	1966	
1964		Sept. 3	36.88	May 20	36.90	Jan. 5	36.83
Jan. 14	37.57	Oct. 7	36.99	June 22	36.68	Feb. 2	36.75
Feb. 12	37.58	Nov. 18	37.08	July 13	36.78	Mar. 16	36.64
Mar. 11	37.56	Dec. 8	36.94	Aug. 11	36.93	Apr. 22	36.75
Apr. 13	37.18	1965		Sept. 9	36.94	May 18	36.52
May 12	37.05	Jan. 21	36.91	Oct. 6	36.93	June 22	36.54
June 11	37.00	Feb. 18	36.93	Nov. 8	36.95	July 16	36.51

TABLE 4.--Chemical analyses of water

Explanation: (A) Analysis by U.S. Geological Survey. (B) Analysis by North Dakota State Department of Health. (C) Analysis furnished by Amerada Petroleum Corporation. (E) Deviation between equivalents per million of cations and anions exceeds 1 percent of sum of cation and anion equivalents per million.

Source: Mm, Madison Group, of Mississippian age; Kd, Dakota Group, of Cretaceous age; Tfu, Fort Union Group, of Tertiary age; Qd, glacial drift, Qal, alluvium, of Quaternary age.

Except where otherwise stated, the analyses were run by the North Dakota State Laboratories.

[Analytical results in parts per million except as indicated]

Location	Depth	Source	Date of collection	Temperature (°F)	Silica (SiO_2)	Total iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Sum	Dissolved solids: Residue on evaporation at 180°C	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium-adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Remarks
152-100- 3bbb	750	Tfu	8-18-65	59	2.5	0.18	6.8	0.7	838	2.6	2,020	71	10	75	2.8	0.8	0.25	2,010	1,990	20	0	99	81	3,050	8.5	
152-103- 7ddd	153	Qal	6-15-65	...	28	2.7	149	28	157	12	682	0	256	9.5	.4	2.2	.44	979	970	486	0	37	3.1	1,420	8.0	
8bbb	137	Qal	6-14-64	48	25	10	188	45	295	15	598	0	770	6.8	.3	.4	.34	1,650	1,690	653	163	49	5.0	2,150	8.0	
152-104- 1ddd	76	Qal	6-16-65	...	28	24	189	43	1,290	15	1,150	0	2,430	24	.0	1.8	.50	4,610	4,650	650	0	81	22	5,760	8.0	
8bca	100	Tfu	9-29-60	...	.....	1.82	32.8	20.2	948		1,070	0	1,275	20	...	11.1	.....	.....	3,376	165	.....	..	.....	.....	...	B
11add	110	Qal	6-15-65	...	27	10	300	95	935	21	922	0	2,430	13	.0	.9	.39	4,290	4,260	1,140	385	64	12	4,950	8.1	
153-102- 2cbb2	203	Tfu	8-30-56	...	.....	.....	.....	.....	.....	.....	1,130	86	.....	.....	...	0	.....	.....	.....	1,635	60	..	.....	.....	8.3	B
17ccal	30	Tfu	10-16-64	...	.....	.....	.....	.....	799	.....	1,153	60	.....	.....	...	4	.....	.....	3,138	225	.....	..	.....	.....	...	B
17cce1	75	Qal	5-20-65	50	12	.14	78	47	924	14	915	20	1,490	23	1.5	93	.55	3,150	3,160	388	0	83	20	3,670	8.3	
17cce2	.....	Lake	6-2-65	54	4.0	.24	54	16	115	8.0	264	0	226	11	.4	.2	.00	565	518	200	0	54	3.5	869	8.1	
17cdb	328	Tfu	5-13-65	45	6.5	.12	3.2	3.6	750	5.2	1,860	47	16	18	4.0	.0	.15	1,770	1,750	23	0	98	68	2,670	8.5	
17dcc	68	Qal	1965	...	.....	5.2	120	43	578	.....	1,068	0	950	8	.9	<4.5	.....	1,963	.....	479	.....	..	.....	2,125	7.4	B
17ddc2	30	Qal	4-21-66	44	22	2.1	140	55	469	9.2	803	0	878	18	.5	.4	.18	1,990	1,950	575	0	63	8.5	2,740	8.2	
20aab	42	Qal	1965	...	.....	5	345	.....	.....	.....	939	..	.....	.....	...	4	.....	.....	.....	.....	.....	..	.....	3,500	...	B
153-104- 1dad	125	Tfu	.....	49	25	.54	113	67	233	6.2	600	0	550	1.7	.1	1.1	.15	1,290	1,350	556	65	47	4.3	1,840	7.6	
154- 95-18c	86	Tfu	8-25-59	...	.....	1.2	60	22.9	336		774	0	325	3.0	.1	0	.....	.....	1,520	243	.....	..	.....	.....	...	B
154- 96- 8bab	69	Qal	9-14-65	...	16	1.2	94	46	218	7.8	605	0	389	2.6	.3	.0	.20	1,070	.....	422	0	52	4.6	1,600	8.2	
154- 97-12bbb	100	Qal	9-14-65	48	16	1.7	102	69	193	7.8	600	0	427	4.6	.2	.0	.26	1,120	.....	538	47	43	3.6	1,660	8.2	
14acb	130	Qal	4-66	...	23	1.1	116	34	191	8.6	587	0	354	6.0	.3	.8	.42	1,020	1,010	430	0	49	4.0	1,520	8.2	
14acc1	136	Qal	7-17-66	48	29	1.3	118	45	177	8.9	626	0	354	1.8	.5	.7	.55	1,050	1,030	480	0	44	3.5	1,500	7.9	
14acc2	130	Qal	4-21-66	48	.....	.....	.....	.....	171	.....	.....	..	.....	.....	...	.....	...	.....	.....	383	.....	49	3.8	1,380	...	
14bdd	120	Qal	4-22-66	...	25	1.1	122	31	183	8.0	582	0	342	7.0	.3	.8	.34	1,010	1,000	434	0	47	3.8	1,480	8.0	
14dbb	120	Qal	4-23-66	...	26	1.4	120	39	172	7.6	596	0	319	5.0	.3	.4	.24	985	981	460	0	44	3.5	1,490	8.1	
24bbb	80	Qal	8-24-65	...	12	.08	142	35	27	4.7	288	0	308	5.0	.1	15	.26	691	718	500	264	10	.5	1,010	8.1	
154- 99-34bcb	.....	Spring	1-11-63	...	.....	1.2	188	61	458	.....	805	0	1,575	10	.0	0	.....	3,100	.....	720	.....	..	.....	.....	6.7	B
154-100-20bba	48	Qd	5-26-65	49	32	.50	183	116	3,040	15	886	0	760	4,140	.7	3.0	.65	8,720	9,250	933	206	87	43	14,100	7.7	
20bbb	51	Qd	5-26-65	49	27	.60	750	453	21,800	89	506	0	1,390	35,400	1.0	.0	1.0	60,200	64,000	3,740	3,320	93	161	87,400	7.2	
154-101- 2bbb	35	Tfu	6-22-66	...	41	3.4	88	30	111	9.5	464	0	205	1.0	.4	2.5	.00	721	930	343	0	40	2.6	961	6.3	
2bcb	53	Tfu	6-22-66	...	19	.64	65	29	175	6.9	608	0	164	.8	.4	.4	.00	763	800	281	0	57	4.5	1,180	7.2	
21ddd	65	Qd	5-25-66	47	22	1.1	138	60	169	6.8	443	0	561	8.0	.3	.9	.00	1,190	1,230	592	229	38	3.0	1,670	7.7	
154-102-25abd1	110	Qd	7-15-65	...	18	.62	58	35	39	6.8	425	0	31	1.0	.2	1.1	.00	400	377	287	0	22	1.0	680	7.4	
154-103- 2baa	100	Tfu	1-27-58	...	.....	1.3	.....	.....	.....	.....	552	0	.....	.....	...	Trace	.....	.....	582	298	.....	..	.....	.....	...	B
19ddd	24	Qd	6-9-65	54	17	.04	256	79	53	5.6	332	0	635	48	.2	56	.00	1,310	1,420	965	695	11	.7	1,800	7.8	
30ccb	350	Tfu	2-28-63	...	.....	.....	.....	.....	357	.....	720	96	400	.....	...	11	.....	1,544	.....	160	.....	..	.....	.....	...	B
155- 95- 3bcb	75	Qd	5-19-66	44	14	.32	170	50	35	4.4	674	0	122	3.6	.1	1.1	.00	733	741	630	78	11	.6	1,160	7.8	
7dd	5,040	Kd	11-4-60	140	.....	.6	.....	.....	.....	.....	.....	..	891	4,240	...	.....	.....	.....	.....	72	32	..	.....	.....	7.8	C
32ddc1	10	Qal	5-19-66	37	17	.14	113	69	369	6.3	664	0	347	339	.1	21	.18	1,610	1,650	564	20	58	6.8	2,560	8.2	
155- 96- 1bc	4,599-4,647	Kd	5-19-66	140	.....	.....	53	0	3,670	.....	994	0	1,000	4,440	...	.....	.....	9,650	10,300	.....	.....	..	.....	.....	7.6	C
35aa	4,925	Kd	8-11-58	143	25	1.5	20	.5	3,860	.....	.....	..	1,300	3,900	...	.....	.....	11,000	.....	.....	.....	..	.....	.....	7.4	C
155- 97-31dba2	120	Tfu	5-25-66	49	10	.2	53	20	158	3.5	468	0	161	1.0	.3	2.2	.27	640	660	216	0	61	4.7	1,030	8.0	

TABLE 4.--Chemical analyses of water, Continued

[Analytical results in parts per million except as indicated]

Location	Depth	Source	Date of collection	Temperature (°F)	Silica (SiO_2)	Total iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Sum	Dissolved solids: Residue on evaporation at 180°C	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium-adsorption-ratio	Specific conductance (micromhos at 25°C)	pH	Remarks
155- 97-36dca1	780	Tfu	5-19-66	57	11	.30	3.6	212	862	2.8	1,520	0	14	424	.6	.7	2.8	2,070	2,140	18	0	99	88	3,380	8.3	
155- 98-33cbb	70	Qa	5-19-66	45	15	.26	87	55	22	4.7	400	0	151	6.1	.2	1.3	.23	540	585	444	116	10	.45	862	7.9	
155- 99- 1bcc	61	Tfu	7-14-65	...	17	.60	45	22	170	3.9	384	0	240	6.5	.1	1.3	.00	695	660	204	0	64	5.2	1,070	7.7	
155-100- 6aaa2	126	Qa	10-16-58	...	21	9.8	58	62	448	6.8	776	0	730	15	.4	1.8	.48	1,730	1,770	399	0	71	9.7	2,480	7.8	A
30ddc	28	Qa	10-24-58	...	26	1.4	63	37	265	6.6	801	0	215	16	1.0	3.6	.18	1,030	1,040	310	0	64	6.5	1,560	7.3	A
31bbb	90	Qa	10-23-58	...	20	.67	64	37	271	6.8	794	0	236	16	.8	1.2	.20	1,040	1,050	312	0	65	6.7	1,590	7.4	A
155-101-20bbc	129	Tfu?	4-27-61	...	.....	.....	.....	.....	.....	...	588	0	.....	.....	...	4	...	.....	2,290	1,550	.....	...	.....	.....	7.1	B
24ddd	72	Qa	9-5-64	...	21	3.1	90	52	185	10	700	0	263	3.9	.7	2.0	.00	975	988	440	0	47	3.8	1,510	7.6	
36bcc	Spring	Tfu?	8-6-65	48	13	.07	54	21	210	3.8	588	0	188	2.0	.2	2.0	.10	785	757	220	0	67	6.2	1,230	7.6	
155-102- 8dda	52	Tfu	5-25-66	...	23	16	122	51	55	6.8	378	0	302	10	.1	2.4	.30	775	835	514	204	13	1.1	1,090	7.3	
32ccc	40	Tfu	7-22-65	47	15	3.9	118	73	696	9.6	924	0	1,300	25	.1	4.9	.75	2,700	2,770	595	0	71	12	3,590	7.5	
155-103-22bad	47	...	11-21-61	...	.....	.....	.....	.....	12	.....	476	0	.....	.....	...	111	.....	.....	1,600	975	.....	..	.....	.....	7.9	B
33bcc	117	Tfu	9-12-65	...	13	.90	86	54	39	5.2	426	0	140	9.0	.3	49	.26	607	571	436	87	16	.8	936	8.0	
155-104- 2aad	113	Tfu	5-13-57	...	.....	.....	.....	.....	.....	.....	937	0	.....	.....	...	Trace	.....	.....	.....	1,080	332	..	.....	.....	...	B
156- 95-10ad	.....	Kd	8-5-53	...	.....	.....	83	23	4,020	.....	801	..	848	5,330	...	.....	.....	10,700	10,900	.....	.....	..	.....	.....	7.6	C
156- 97- 5bdd	187	Tfu	9-24-62	...	.....	.....	.....	.....	130	.....	815	0	.....	.....	...	.5	.....	.....	1,430	610	.....	..	.....	.....	...	B
9caa	184	Qa	8-13-65	46	14	.92	80	49	69	7.8	517	0	123	2.6	.2	.7	.20	602	570	400	0	27	1.5	969	7.5	
9cdc	156	Qa	8-13-65	47	15	2.8	142	78	49	8.8	518	0	350	3.2	.1	1.8	.20	906	905	676	252	13	.8	1,280	7.5	
24cda	80	Qa	5-19-66	46	16	.34	256	122	132	9.1	498	0	886	32	.1	26	.00	1,720	1,890	1,140	733	20	1.7	2,190	7.9	
26bba1	150	Qa	7-3-64	...	15	1.1	85	50	82	4.5	542	0	144	.5	.6	14	.80	663	686	418	0	30	1.8	1,080	8.2	
156- 98- 7ccc	65	Qa	5-27-66	...	18	.1	224	127	28	9.1	390	0	695	71	.1	16	.04	1,380	1,540	1,080	761	5	.4	1,880	7.8	
35bda	187	Tfu	7-14-65	48	14	1.5	124	42	262	9.2	828	0	370	9.0	.2	1.3	.50	1,240	1,240	484	0	53	5.2	1,780	7.6	
156-100- 7ccc2	52	Qal	10-29-58	47	24	.67	89	56	289	7.0	668	0	540	8.0	.4	.4	.22	1,340	1,380	454	0	58	5.9	1,960	7.3	A
33ccc	63	Qal	10-21-58	44	24	3.9	91	43	240	6.8	723	0	332	5.4	.4	3.9	.29	1,100	1,090	402	0	56	5.2	1,620	7.0	A
35dda2	235	Tfu	5-27-66	...	17	8.9	86	56	191	7.7	686	0	266	1.3	.3	.2	.23	973	925	444	0	48	3.9	1,480	7.6	
156-101- 4cdd	38	Tfu?	5-27-66	...	20	1.0	85	56	331	6.7	737	0	501	3.2	.1	.9	.39	1,370	1,380	444	0	61	6.8	2,020	7.4	
156-102- 8daa	54	Tfu	5-25-66	45	13	24	42	32	788	6.8	1,290	0	835	5.8	.1	2.2	.51	2,380	2,350	238	0	87	22	3,430	7.9	
17aad1	18	...	1-22-60	...	.....	.....	.....	.....	.....	.....	693	0	867	.....	...	Trace	.....	.....	1,455	1,292	.....	..	.....	.....	...	B
156-103-15dda2	90	Tfu?	4-30-63	...	.....	40	.....	.....	209	.....	498	0	.....	.....	...	0	.....	.....	1,760	645	.....	..	.....	.....	...	B
33aab1	180	Tfu	5-26-66	46	22	1.8	155	59	56	6.6	704	0	153	3.5	.1	4.0	.39	808	811	630	53	16	97	1,250	7.4	
157- 95-12bc	8,312-8,350	Mm	1-20-56	...	.....	.....	14,700	2,160	103,000	.....	204	0	490	191,000	...	.....	.....	311,000	316,000	.....	.....	..	.....	.....	5.5	C
27dbd	116	Qa	8-12-65	48	16	.08	106	97	176	9.9	827	0	356	4.6	.2	.7	.53	1,170	853	664	0	36	3.0	1,730	7.8	
27dcb	120	Tfu?	9-60	...	.....	5.8	67	108	269	13.5	.....	0	567	Trace	.4	0	.23	1,588	.....	612	.....	41	.....	2,070	8.2	
27ddc	100	Qa	7-57	...	.....	.9	51	43	29	4.0	.....	0	26	0	.2	0	0	410	.....	302	.....	..	.....	.....	7.5	
34baa	96	Tfu?	9-2-58	...	.....	2.4	109	83	80	.....	684	0	217	2.6	.1	Trace	.....	1,180	.....	612	.....	..	.....	.....	...	B
157- 96-18bba	180	Qa	5-26-66	...	25	9.6	186	135	215	8.4	847	0	735	3.0	.2	5.8	.31	1,740	1,580	1,020	326	31	2.9	2,310	7.5	
26ccc	115	Tfu	7-14-66	46	18	11	518	376	121	9.4	630	0	2,140	106	.2	159	.00	3,770	4,150	2,840	2,330	8	1.0	4,110	7.8	E
157- 97- 3bbb	199	Qa	6-15-65	46	22	.11	266	157	230	14	836	0	1,100	7.3	.4	.2	.70	2,210	1,790	1,310	626	27	2.8	2,750	8.0	
10ccc	166	Qa	2-3-66	43	32	21	212	124	234	14	786	0	883	4.0	.1	1.0	1.1	1,910	1,960	1,040	396	32	3.2	2,490	7.2	
14ccc	220	Qa	6-17-65	46	22	.28	354	167	106	15	746	0	1,160	5.0	.2	.7	.20	2,200	2,250	1,570	959	13	1.2	2,580	7.9	
157- 98-15cbc2	145	Tfu	5-26-66	...	19	1.1	111	66	40	6.6	548	0	173	2.0	.1	0	.43	689	690	548	99	14	.7	1,070	7.5	
157- 99-21bbb	145	Tfu	5-26-66	...	21	2.6	171	108	219	8.8	917	0	570	2.5	.3	.0	.51	1,560	1,570	872	121	35	3.2	2,160	7.6	
157-101- 8bbc	50	Tfu	10-1-60	...	.....	.....	...	.....	.....	.....	677	0	.....	.....	...	4.43	.....	.....	941	560	.....	..	.....	.....	...	B
15b	0	Lake	6-3-65	59	7.0	.42	52	18	81	12	302	0	146	4.5	.2	.4	.00	471	438	202	0	45	2.5	745	8.1	
157-103-12ddc	72	Qa	5-26-66	45	22	3.2	173	56	12	6.2	600	0	185	9.8	.3	2.2	.08	766	771	660	169	4	.2	1,170	7.6	
158- 98-11abb	126	Qa	5-29-63	...	.....	.....	.....	.....	255	.....	793	0	.....	.....	...	4.4	.....	.....	2,627	740	.....	..	.....	.....	...	B
25dcb2	63	Qal?	5-20-66	...	17	.24	366	216	92	5.7	406	0	1,430	38	.0	142	.30	2,510	2,750	1,800	1,470	10	.9	2,910	8.0	
35ddd	217	Tfu?	10-53	...	.....	.24	.....	.....	830	10	.....	..	764	20	1.3	41	.....	.....	2,443	16	.....	..	.....	.....	9.0	
158- 97-19aaa	178	Qa	6-16-65	46	22	.14	176	102	499	12	1,000	0	979	8.4	.4	.2	.00	2,290	2,330	860	41	55	7.4	3,175	7.9	
33bbb	198	Qa	6-16-65	46	20	.24	204	119	187	13	713	0	815	4.5	.1	.4	.18	1,720	1,690	1,000	416	29	2.6	2,240	7.9	
												131														

TABLE 4.--Chemical analyses of water, Continued

[Analytical results in parts per million except as indicated]

Location	Depth	Source	Date of collection	Temperature (°F)	Silica (SiO_2)	Total iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Sum	Dissolved solids: Residue on evaporation at 180°C	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium-adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Remarks
158- 98- 7ddd	280	Qd	6-22-65	...	17	10	264	112	297	15	896	0	1,030	5.3	.1	.80	....	2,190	2,230	1,120	386	36	3.9	2,800	7.9	
158- 99- 7ddd	100	Qd	6-23-65	...	19	6.7	246	105	250	15	843	0	845	4.3	.1	4.4	.88	1,910	1,990	1,050	354	34	3.4	2,500	7.9	
12dcc	130	Qd	8-18-65	46	17	9.1	220	132	203	10	877	0	815	6.2	.1	1.0	.65	1,850	1,820	1,090	372	29	2.7	2,370	7.7	
13ddd	258	Qd	6-23-65	...	20	1.5	168	65	214	10	760	0	497	1.5	.2	.4	.40	1,350	1,380	685	62	40	3.5	1,900	8.0	
15aaa1	180	Qd	6-23-65	...	18	12	272	139	259	16	878	0	1,090	5.7	.0	.4	.77	2,250	2,320	1,250	531	31	3.2	2,770	7.8	
15aaa2	130	Qd	9-9-65	46	12	2.8	174	104	210	10	698	0	715	3.8	.2	4.7	.39	1,580	1,540	862	290	34	3.1	2,140	8.3	
16cdd	85	Qd	8-19-65	...	18	4.8	190	107	191	7.5	760	0	687	5.6	.2	.9	.60	1,590	1,590	915	292	31	2.8	2,110	7.8	
158-100- 6ddd	80	Qd	7-1-64	48	19	.42	96	55	92	3.3	351	0	368	1.5	.4	.0	.35	808	880	465	178	30	1.8	1,190	8.2	
8daa1	160	Qd	5-9-66	...	25	2.3	120	50	352	7.7	853	0	531	11	.3	.4	.35	1,520	1,580	504	0	60	6.8	2,150	8.1	
8daa2	80	Qd	5-10-66	...	24	2.8	129	65	353	8.7	841	0	649	11	.4	.8	.46	1,660	1,690	590	0	56	6.3	2,340	8.1	
17abb	110	Qd	5-9-66	...	24	2.9	156	78	277	9.7	790	0	660	8.0	.3	.4	.53	1,610	1,650	710	63	45	4.5	2,250	8.1	
17abc1	67	Qd	5-6-66	...	22	2.9	227	108	284	12	856	0	892	8.0	.2	.4	.58	1,980	1,990	1,010	309	38	3.9	2,630	7.8	
17abc2	80	Qd	5-6-66	...	22	2.5	231	99	326	12	884	0	880	7.0	.2	.4	.46	2,020	2,080	982	258	42	4.5	2,700	7.8	
17abc4	91	Qd	7-5-66	...	26	2.7	195	109	334	13	864	0	930	6.6	.3	.4	.27	2,050	1,880	937	228	43	4.8	2,620	7.6	
17abc4	91	Qd	7-6-66	...	26	2.5	192	105	332	13	849	0	930	4.9	.2	.6	.27	2,020	1,940	911	215	44	4.8	2,540	7.6	
17abc4	91	Qd	7-8-66	...	26	2.6	188	105	332	13	846	0	910	5.3	.2	.6	.27	2,000	1,920	901	208	44	4.8	2,550	7.6	
17add	45	Qd	5-10-66	...	25	4.9	154	104	190	8.4	631	0	688	5.3	.1	.4	.30	1,490	1,500	810	293	34	2.9	1,970	8.0	
19ccc	84	Qd	11-6-58	45	24	1.2	103	48	246	7.2	659	0	437	10	.4	1.2	.21	1,200	1,210	456	0	54	5.0	1,730	7.3	
20aab	96	Qd17	6-1-66	...	25	.2	145	88	195	8.6	677	0	561	3.2	.2	.2	.23	1,360	1,390	724	169	37	3.2	1,880	7.6	
158-101- 2bcb	116	Tfu	5-26-66	...	11	2.3	14	8.5	472	2.5	870	0	343	3.3	.9	3.1	.20	1,290	1,310	70	0	93	7.7	1,970	8.1	
158-102-17dda	30	Qd	4-9-63	...	..	.....	.....	.....	1,287	....	348	0	.....	.....	...	33.2	....	.....	5,176	450	.....	..	.....	.....	...	B
28aba	240	Tfu	8-17-65	48	12	.74	106	60	566	7.7	954	0	932	3.2	.0	.7	.70	2,160	2,190	510	0	70	11	2,930	8.0	
30adc	110	Tfu	4-30-64	44	7	.....	135	79	98	8.4	658	0	327	4.8	.3	.0	....	977	1,010	663	123	24	1.7	1,470	7.0	
158-103- 1cbc	25	Qd	9-11-65	44	20	2.5	100	42	122	5.6	565	0	250	2.0	.2	1.3	.04	824	783	424	0	38	2.6	1,230	7.9	
159- 95-14cca	16	Qd	8-12-65	48	17	.06	130	79	64	7.1	324	0	314	72	.0	120	.00	963	960	490	185	17	1.1	1,400	7.6	
14dcc	25	Qd	11-9-59	49	14	.34	87	93	249	14	439	0	626	112	.2	2.1	.29	1,410	1,460	600	240	47	4.4	2,050	7.7	
15dda	31	Qd	11-23-59	48	25	3.0	122	108	80	12	406	0	554	8.0	.2	.9	.13	1,110	1,190	747	414	19	1.3	1,510	7.2	
23dad	42	Qd	11-18-59	47	25	3.5	103	85	501	8.6	678	0	1,060	12	.2	.8	.26	2,130	2,220	608	52	64	8.8	2,930	7.4	
26cbb	325	Tfu	4-22-63	...	..	.....	.....	.....	.....	....	1,760	60	.....	.....	.....	0	....	.....	2,095	.....	.....	..	.....	.....	8.9	B
159- 96- 3ddd	320	Tfu	8-18-65	45	8.0	5.2	84	13	1,350	5.4	1,340	0	1,980	52	.2	.9	.35	4,160	4,300	263	0	92	36	5,280	8.2	
159- 97- 2baa	119	Qd	6-8-65	48	25	.07	110	34	143	10	437	0	350	22	.2	.2	.00	909	899	415	57	42	3.0	1,340	7.6	
159- 98-10aad	216	Qd	9-8-65	48	12	1.9	71	47	816	6.7	948	0	1,340	9.6	.0	.6	.20	2,770	2,780	370	0	82	18	3,840	8.3	
10acd	135	Qd	7-16-65	...	24	.60	78	18	100	6.3	404	0	157	3.0	.3	1.3	.00	588	556	268	0	44	2.7	890	7.8	
159- 99-21dab	140	Tfu	4-30-64	46	..	.....	68	28	88	6.0	434	0	127	6.3	.4	.1	....	538	550	285	0	39	2.3	877	7.3	
22cbb	128	Tfu?	7-16-65	...	19	.20	61	14	224	5.7	569	0	222	3.5	.3	.4	.20	830	807	208	0	69	6.7	1,270	7.7	
159-100-27acb	30	Qd	5-12-65	46	20	.27	64	30	77	4.6	369	0	125	3.5	.2	27	.60	534	541	284	0	37	2.0	855	7.9	
28add	100	Qd	10-28-63	...	21	.40	66	125	230	22	620	0	680	4.0	.2	0	0	1,450	1,550	680	170	41	3.9	2,430	7.9	
159-101-18aad	40	Tfu	11-18-58	...	..	.....	.....	.....	.....	.....	780	0	.....	.....	...	2.0	....	.....	2,130	580	.....	...	.....	.....	...	B
18bbc	200	Tfu	5-5-66	47	14	.60	6.4	3.4	739	2.5	1,200	42	536	17	1.6	1.2	.53	1,960	1,920	30	0	98	59	2,950	8.5	
25bbc	28	Qd	7-13-65	46	19	.10	101	39	41	5.3	307	0	174	22	.2	52	.00	605	578	414	163	17	.9	910	7.7	
26aab	205	Tfu	7-13-65	...	14	.16	28	13	418	2.7	838	0	336	3.5	.4	.8	.00	1,230	1,230	125	0	88	16	1,880	8.1	
26abc	50	Qd	10-28-63	...	18	.10	39	81	172	18	464	0	442	2.0	.2	0	0	1,000	1,100	435	55	45	3.6	1,623	8.0	
159-102-26bba	110	Tfu	5-26-66	44	17	2.8	195	110	392	8.4	742	0	1,150	5.6	.0	.5	.50	2,250	2,370	940	332	47	5.6	2,960	7.4	
159-103- 6ddd	160	Qd	6-29-64	48	21	.62	85	48	236	4.5	659	13	319	18	.6	20	.50	1,090	1,150	410	0	55	5.1	1,630	8.4	
10bbb	250	Qd	10-22-63	...	27	4.8	43	38	371	15	834	0	380	15	.7	1.5	.00	1,300	1,370	264	0	74	9.9	1,980	8.2	
12caa	26	Qd	7-13-65	47	22	.42	144	31	40	18	518	0	92	47	.1	.9	.00	650	619	486	62	15	.8	1,040	7.5	
12cad	38	Qd	3-17-59	...	..	Trace	66.4	26.8	14.7	....	327	0	37	1.0	.8	Trace	....	.....	474	276	.....	..	.....	.....	7.2	B
12cad	38	Qd	7-13-65	47	24	.08	122	30	24	14	481	0	54	42	.1	.7	.30	548	477	426	32	10	.5	890	7.0	E