

NORTH DAKOTA GEOLOGICAL SURVEY

WILSON M. LAIRD, *State Geologist*

NORTH DAKOTA STATE

WATER CONSERVATION COMMISSION

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NORTH DAKOTA

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STATE WATER COMMISSION

MILO W. HOISVEEN, *State Engineer*

COUNTY GROUND WATER STUDIES 6

GEOLOGY AND GROUND WATER RESOURCES

of Divide County, North Dakota

PART II

GROUND WATER BASIC DATA

By

C. A. ARMSTRONG

GEOLOGICAL SURVEY

United States Department of Interior



Prepared by the United States Geological Survey
in cooperation with the North Dakota Geological Survey
and the North Dakota State Water Commission

1965

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Wilson M. Laird, State Geologist
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This is one of a series of county reports published cooperatively by the North Dakota Geological Survey and the North Dakota State Water 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.

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Geology and Ground Water Resources of Divide County, North Dakota
Part II, Ground Water Basic Data

by
C. A. Armstrong

INTRODUCTION

Purpose and scope

The geology and ground-water resources of Divide County, North Dakota (fig. 1) has been investigated cooperatively by the U. S. Geological Survey, the North Dakota State Water Commission, and the North Dakota Geological Survey. The results of the investigation are to be published in three parts. Part I, an interpretive report describing the geology, Part II, ground-water basic data, and Part III, an interpretive report describing the ground-water resources. Part II makes available data collected during the investigation and functions as a reference to Parts I and III. The reports will be published as separate volumes of the Bulletin series of the North Dakota Geological Survey and the county ground-water study series of the North Dakota State Water Commission.

The data in this report are useful for predicting subsurface conditions in Divide County. The depth and thickness of aquifers, water levels, and quality of water may be estimated for a given site by examining the tables and maps in this report. Extrapolations based on these data should be conservative because of the irregular distribution of materials within the glacial drift.

Much of the data in this report was collected during field studies made between July 1962 and December 1964. Other data were obtained from: (1) an unpublished Works Progress Administration report, which shows 1934 and 1938 water levels, (2) records collected during 1945 and 1951 for the Missouri River basin development investigation, (3) North Dakota State Water Commission drillers' logs compiled in 1959, and (4) a few miscellaneous data collected by the U. S. Geological Survey between 1951 and 1960. This accumulation of data is presented in five tables: (1) data from a comprehensive inventory of water wells, test holes, and springs, (2) drillers' and composite logs of wells and test holes, (3) water levels in observation wells, (4) partial chemical analyses of water from a report by LaRocque and others (1963), and (5) chemical analyses of water. Additional logs, water levels, and chemical analyses of ground water are published in an open file report by LaRocque and others (1963) and in U. S. Geological Survey Water Supply Papers 598 and 1428.

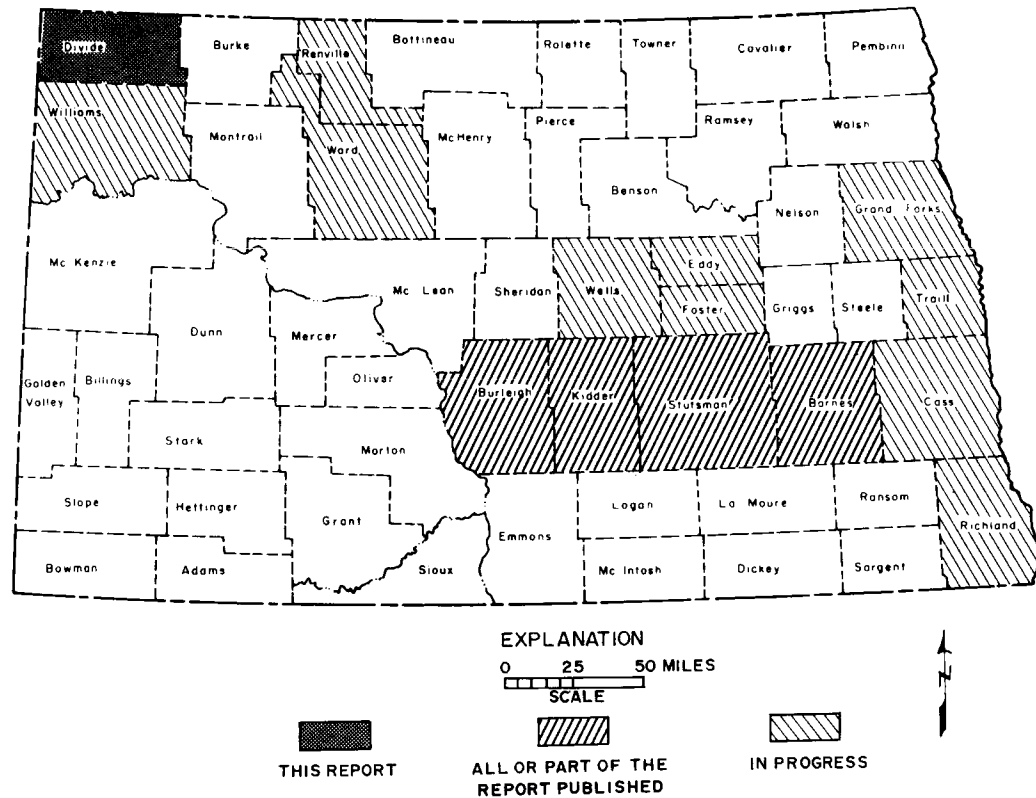


FIGURE 1—MAP OF NORTH DAKOTA SHOWING LOCATION OF COUNTY GROUND-WATER STUDIES

Well-Numbering System

The wells, test holes and springs in the tables are numbered according to a system based on their location in the public land classification of the United States Bureau of Land Management. It is illustrated in figure 2. The first numeral denotes the township north of 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, the northwest, southwest, and southeast quarter sections, quarter-quarter section, and quarter-quarter-quarter sections (10-acre tract). For example, well 160-95-15daa is in the NE 1/4 sec. 15 T. 160 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 figures 3 and 4 (in pocket).

Acknowledgments

The author is especially grateful to Schnell Inc., Marinus Jensen, Oscar Weber and other drillers who supplied logs and information for this report. Thanks are also due to the County Commissioners, township assessors, and the people of Divide County for their cooperation in the collection of these data. Sample analysis logs were compiled principally by R. W. Schmid and L. L. Froelich of the North Dakota State Water Commission.

Explanation of Tables

Table 1 shows many wells with the abbreviations Lpc in the remarks column. This indicates that the aquifer will yield less than the capacity of the pump. Therefore, the well can be pumped dry with the pump shown in the lift and power column. Most of the farm wells in the county are equipped with pumps that have capacities of less than 10 gpm (gallons per minute); cylinder pumps usually are limited to 2 to 5 gpm.

Test holes 2243 and 2249 and 3000 to 3090 were drilled as part of this investigation. The unnumbered U. S. Geological Survey test holes were drilled as part of the Missouri River basin investigation (MB). These logs are from LaRocque and others (1963). Test holes 1523 to 1532 were drilled by the North Dakota State Water Commission (ND) as part of a special State investigation. Other test holes were drilled by their owners. Owners numbers are used in table 1 but only test holes drilled during this investigation are numbered on figure 4.

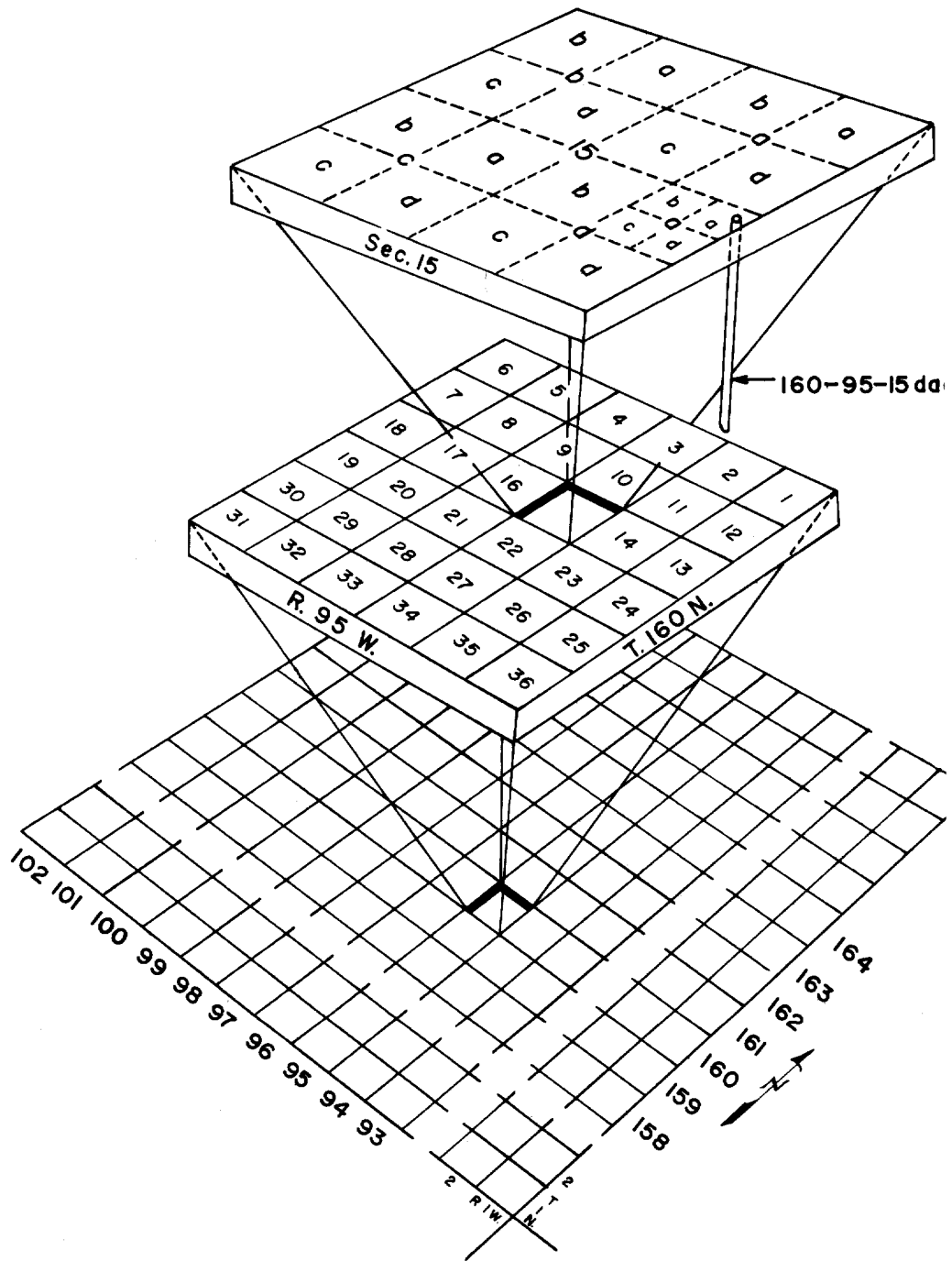


FIGURE 2--SYSTEM OF NUMBERING SPRINGS, WELLS, AND TEST HOLES.

The numbered test-hole logs are a composite from the drillers log, sample-analysis log, and electric log (when available). Logs of unnumbered test holes and wells were furnished by the driller or drilling company shown in the heading of the log, or, were obtained from the report by LaRocque and others (1963). The terminology used is that of the individual driller with the exception that the order has been changed to present the principal lithology first. The drilling intervals shown in these logs were rounded to the nearest half foot where a lesser interval was listed.

Sample-description logs for test holes 3000 to 3039, 3075 to 3090, and 2243 to 2249 were prepared at the drilling site of each test hole. Visual examination, while the samples were still wet and fresh, was made by the use of a binocular microscope. Color descriptions were determined by comparing the sample with the color charts of Goldman (1928). If the cuttings reacted (effervesced) with diluted acid the material was described as calcareous. Grain-size determinations used in all logs refer to the Wentworth (1922) size scale. Sorting is used as an indication of size distribution on either side of an average. Cohesion is used to indicate the capacity of the material to stick together. Since most clays and silts are cohesive to some degree the term was not used in the descriptions unless the material was unusually cohesive.

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

Observation wells were developed in selected test holes. These normally consisted of 1½-inch plastic pipe slotted in the lower 10 or 20 feet. They were pumped for a few hours and a sample of water was collected for chemical analysis (table 5). Monthly water-level measurements (table 3) have been made in most of the wells.

Names of the bedrock formations, such as Tongue River and Cannonball Formation, are based on usage of the North Dakota Geological Survey. The Tongue River and Cannonball are considered members of the Fort Union Formation by the U. S. Geological Survey.

Quality-of-Water Data

Several factors determine the concentration and character of mineral constituents in ground water. The most important are the source of the water, the mineral composition of the rocks through which the water has passed, and the length of time the water has been in contact with the rock. Precipitation as rain dissolves some gases from the air. That part of the precipitation that percolates to the water table, having dissolved carbon dioxide from the air as well as from the organic matter in the soil, reacts with rock particles, dissolving them and forming new compounds. The dissolved-solids content of water usually increases with depth, because the deeper water generally has been in contact with rock minerals longer than has water at shallow depths. The principal constituents in ground water are calcium, magnesium, sodium, potassium, bicarbonate, sulfate, and chloride. Other constituents include silica, iron, nitrate, fluoride, and boron. Most analyses are given in parts per million (ppm)--a unit that expresses concentration of chemical constituents by weight.

Specific conductance is a convenient, rapid determination used to estimate the amount of dissolved solids in water. An approximate value for dissolved solids concentration can be obtained by multiplying the specific conductance by 0.65.

The suitability of a water for public supply and domestic use can be judged by standards that have been established by the U. S. Public Health Service (1962, p. 7-8) for drinking water used on interstate carriers. Some of these standards are as follows:

Iron (Fe) should not exceed 0.3 ppm.
Chloride should not exceed 250 ppm.
Sulfate should not exceed 250 ppm.
Fluoride should not exceed 1.7 ppm.
Dissolved solids should not exceed 500 ppm.

These standards were established to protect the health of interstate travelers but generally are also used in evaluating the suitability of public water supplies in the United States. Although many people continually drink water containing substantially higher concentrations than the suggested limits, persons unaccustomed to such water may suffer ill effects until they become adjusted to the change.

Some livestock have been known to survive on water containing as much as 10,000 ppm of dissolved solids (Smith and others, 1942, p. 15). However, water containing much less dissolved solids is desirable for maximum growth and reproduction.

The maximum concentration for nitrate has not been established, but Maxcy (1950, p. 271) states that water having a nitrate content in excess of 45 ppm should be regarded as unsafe for infant feeding because it may cause methemoglobinemia ("blue baby" disease). Also, the presence of nitrate may indicate pollution.

Moderate quantities of fluoride are not known to be detrimental to crops, animals, or adult humans. However, it is generally recognized that a small amount of fluoride in drinking water consumed by children during the time their permanent teeth are being formed reduces the occurrence of dental caries (tooth decay) and that an excess may cause dental fluorosis (mottled enamel).

The tolerances in chemical quality of water for industrial use differ widely for different industries and different processes. In general, water that meets U. S. Public Health Service standards for drinking water is suitable for most industrial uses.

Hardness of water is an important consideration in domestic, municipal, and industrial supplies. It is expressed in parts per million as calcium carbonate. Water having a hardness of 60 ppm usually is rated as soft, whereas water having a hardness of 61 to 120 ppm is considered moderately hard and water having a hardness of 121 to 180 ppm is considered hard. Water having a hardness of more than 180 ppm is regarded as very hard. Hardness is caused almost entirely by calcium and magnesium. As hardness increases, soap consumption for laundering increases, boilers, pipes, and coolers (evaporation pads) become encrusted more rapidly. Silica also forms hard scale in boilers.

Oxidation of dissolved iron in water forms a precipitate that stains laundered clothes and plumbing fixtures. Water containing more than 0.3 ppm of iron is likely to cause objectionable staining. Water that contains iron is especially objectionable in some manufacturing processes.

The usefulness of a water supply for irrigation cannot be predicted solely on the chemical quality of the water. Other factors such as soil texture, infiltration rate, drainage, climate, and salt tolerance of the crop must be considered. According to the U. S. Salinity Laboratory Staff (1954, p. 69-82) the characteristics of an irrigation water that appear to be most important in determining its suitability are: (1) Total concentration of soluble salts; (2) relative proportion of sodium to other cations; (3) concentration of boron or other elements that may be toxic; and, (4) under some conditions the bicarbonate concentration as related to the concentration of calcium plus magnesium.

The U. S. Salinity Laboratory Staff (1954, p. 70) stated that nearly all irrigation water used successfully for a considerable time has a conductivity less than 2,250 micromhos per centimeter at 25° C. Water of higher conductivity is used occasionally but has not been satisfactory except in unusual situations.

The relative proportion of sodium to other cations can be expressed either by percent sodium or SAR (sodium-adsorption-ratio). Both of these figures have been included in table 5.

Generally, the higher the SAR value, the greater the sodium hazard; however, the conductivity or dissolved solids concentration must also be considered in classifying the water according to sodium hazard so that although two waters may have the same SAR value, the water with the highest conductivity is given a higher sodium hazard classification. Samples indicate that water with a SAR value of 8 or less in Divide County would be classified as having a medium or low sodium hazard and water with an SAR value of 14 or more would be classified as having a very high sodium hazard.

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

Owner: USGS, United States Geological Survey; NDSWC, North Dakota State Water Commission.

Depth of well: Measured depths are given in feet, tenths, and (or) hundredths; reported depths are 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, tenths, and (or) hundredths; reported depths in feet.

Use of water or well: D, domestic; Ind, industrial; Irr, irrigation; N, not used; O, observation of water level; Ps, public supply; S, stock; T, test hole.

Aquifer: Cl, clay; Gv, gravel; Lig, lignite; Sd, sand; Sdy, sandy; Ss, sandstone.

Lift and Power: B, bucket; C, cylinder; Cen, centrifugal; J, jet; P, piston, Sub, submersible; Tu, turbine; E, electric; G, gas; H, hand; W, wind.

Remarks: C, chemical analysis is shown in table 4 or 5; L, log described in table 2; Mal, water reported to have alkaline taste; Wh, water reported to be hard; Ws, water reported to be soft; Wp, water reported to be unfit for human consumption; Lpc, well yields less than pump capacity; Pl 30, pumping level in feet below land surface; T, temperature; Td 665, total depth drilled in feet; T₃, additional water levels in table 3; ls, land surface; MB, data from Missouri Basin Investigation (LaRocque and others, 1963).

Location no.	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	Altitude of land surface (feet)	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>160-95</u>												
1b	Olson Estate	70	18	B	1933	35	1934	N	Sd & Gv	...	.....
5abc	Elmer Long	27	36	Dv	....	14	1962	S	Gv & Sd	C,H	.....	Wh, Wal.
6caa	Robert Moss	190	4	Dr	....	105	1962	D	Sd	C,E	.....	Wh.
6cbd	..do...	40	18	Dv	....	..	....	N	..	C,H	.....	Wh, dark color.
7aac	Norbert Tangsrud	5	48	Dv	1961	2	1962	D,S	Sd & Gv	C,H	.....	Wh.
7dab	Robert Tangsrud	100	6	Dr	1910	60	1962	S	Gv	C,E	.....	Wh, Wal, Np.
8cda	Calvin Sillerup	35	48	Du	....	20.64	7-19-62	D,S	Gv	C,E	.....	Wh.
9aad	Michael Smith	20	36	Du	....	14.60	7-19-62	D,S	Gv	C,E	.....	Wh.
9acb	Thomas Olson	23	42	Dv	1957	18	1962	D	Sd	C,G	.....	Lpc.
10bbd	Orrie Sharphol	320	4	Dr	1960	70	1962	D,S	Liq	C,E	.....	C.
12cbb	Jacob Sharphol	85	6	Dr	....	40	1962	N	Sd & Gv	...	.....	Wh.
13dcb	Elmer K. Olson	28	15	B	1961	18	1962	S	Sd & Gv	C,H	.....	Wh.
13ded	..do...	98	12	B	1961	93.5	7-18-62	D,S	Cl & Gv	J,E	.....	Wh.
14ccc1	Olaf Berger	15.1	36	Dv	....	11.4	7-18-62	N	Sd & Gv	E	.....	Wh.
14ccc2	..do...	38	2	Dr	1956	30	1962	D	Sd & Gv	E	.....	Wh.
15cdc	Selmer Johnson	50	12	B	....	30	1962	N	Gv	...	.....	Wh.
18aad	Oscar H. Olson	20	12.36	B	....	11.50	7-17-62	D,S	Sd	C,H	.....	Wh, Lpc.
19bdb	Mrs. Anna Olson	21.6	36	Du	....	14.75	7-17-62	N	..	C,H	.....
20bbb	Clarence Myer	14.8	48	Dv	....	5.61	7-17-62	N	..	C,H	.....
21ddd	Mrs. Jennie Anderson	14	42	Dv	1919	9	1962	N	Sd	...	.....	Wh.
22aad	USGS Test hole 3000	160	4.5	Dr	1963	..	....	N	..	...	2,285	L.
22bbd	Martin Lovdahl	18.9	36	Du	....	14.13	7-18-62	D,S	Sd	J,E	.....	Wh.
23d	A. Johnson	139	4	Dr	....	23	1934	N	Sd	...	.....
26bab	Orville Ness	100	30	B	....	37.26	7-17-62	N	..	C,E	.....	Wh.
27aad1	Harold Nordby	170	4	Dr	1959	90	1962	S	..	C,E	.....	Wh.
27aad2	..do...	25	30	Du	1952	15.45	7-17-62	D	..	C,E	.....	C.
27aad3	..do...	13.2	36	Du	1957	7.65	7-17-62	N	Sd	E	.....	C.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>160-95 (Cont.)</u>												
27daa	Richard Shrooder	170	4	Dr	....	80	1962	S	Sd	C,E	.....
27ddb	..do...	30	42	Du	....	20	1962	D	Cl	C,H	.....
28ccd	Thorstein Skar	Spring	..	..	....	Flow	1962	S	Sd & Gv	..	.....	Flow less than lga
28daa	Mrs. Helen Skar	80	4	Dr	1959	50	1962	D	Gv	C,E	.....	Np.
28dba	..do...	53	18	B	1915	..	....	D	..	C,E	.....
30adb	E. E. McCoy	14	36x48	Du	1961	11.36	7-17-62	D,S	Sd	C,G/H	.....	Ws, Lpc.
31ccd	John Imsland	60	24	B	....	50	1961	D,S	Gv	C,E	.....	Wh, Lpc.
34dd	Ida Johnson	143	8	Dr	1915	83	1934	S	Sd	..	.....
35aac	Ed Schroeder	150	6-4	Dr	....	63	1934	N	Lig	..	.....
<u>160-96</u>												
1ada	Arvid Olson	190	6	Dr	....	150	1962	D,S	..	C,E	.....	Wh.
1dd	Rueben Grina	200	4	Dr	1926	120	1962	D,S	Sd	C,W	.....	Wh.
3cda	Fred Fenster	175	4	Dr	1916	..	....	N	Gv	C,W	.....
4aad	Merle Glasoe	293	44	Dr	1955	150	1962	D	..	C,E	.....	Wh, Np.
4ccb	Elvern Gillund	180	3	Dr	....	120	1962	S	..	..	.....	C.
6aac	W. R. & J. W. Fortier	Spring	..	..	....	Flow	1962	S	..	..	.....
7aac	Clifford Howard	55	24	B	1924	48	1960	D,S	Gv	C,E	.....	Wh.
7cca	Mrs. Margaret Howard	180	3	Dr	1952	120	1962	S	..	C,E	.....	Wh, Wal.
9bbd	Rasmus Skor	100	24	B	1905	70	1962	N	Sd & Gv	C,G	.....	Wh.
11bbd	Thor Volden	35	8	B	1915	30	1962	D	Sd & Gv	C,H/W	.....
11daa	H. J. Hanson	190	4	Dr	1960	90	1962	D,S	Sd	C,G	.....	Wh.
12aaa	Arthur Tangsrud	134	44	Dr	1957	85	1962	D,S	Sd	C,E	.....	Wh.
12odd	Anker Tangsrud	210	6	Dr	old	90	1962	D,S	..	Sub,E	.....	Wh.
13cca	Clifford Haugen	25	48	Du	1905	22	1962	D,S	Sd	C,H	.....	Wh.
13dbb	George Olson	9	48	Du	....	3	1962	D,S	Sd & Gv	..	.....	Ws.
14c	John Fenster	100	4	Dr	1910	75	1934	N	S	..	.....
17cda	C. G. Fortier	40	4	Dr	1958	15	1962	D,S	Sd & Gv	C,E	.....
17cdb	..do...	13	4	Dr	....	F	1962	S	Gv	..	.....	C.
17cdc	..do...	13	4	Dr	....	F	1962	S	Gv	..	.....
21ddd	Ingwold Raymo	12	20	Dr	....	8	1962	D,S	..	C,E	.....

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
22aaa	R. E. Sullivan	97	4	Dr	....	77	1934	N	Gv & Lig	...	.....
24ccc	Knute Vatne	10	36	Du	1950	6.58	7-20-62	D,S	Sd	B,H	.....
24ccd	..do...	96	4	Dr	1925	40	1962	N	Gv	C,G	.....	Wh.
26bbb	USGS Test hole 3001	240	4.5	D	1963	..	....	N	..	...	2,269	L.
27acc	Milton Nygaard	8	..	Dr	....	+ 0.1	7-21-62	S	Sd	C,E	.....	Wh.
27dba	..do...	13.7	36x24	Du	....	6.8	7-21-62	D	Sd	E	.....	Wh.
28a	Inwald Raymo	276	4	Dr	1913	60	1934	N	Gv	...	.....
30ccb	Leo Rosenfold	54	5	Dr	1920+	20	1962	D	Sd	E	.....	Lpc.
32cca	H. O. Hanson	75	..	..	1909	Flow	1962	D,S	Sd & Gv	...	.....
32dad	Jack Farver	72	4	Dr	1912	4.3	7-20-62	N	Gv	C,E	.....
33cbd	..do...	72	2	Dr	1950	10	1962	D	Gv	E	.....
34acc	Charles Myhre	10	36	Du	....	7.47	7-20-62	D,S	Sd & Gv	P,G	.....
<u>160-97</u>												
1cda	A. N. Holter	75	4	Dr	1953	48	1962	D	Gv	J,E	.....	Wh.
4cdd	Eddie Ouren	204	44	Dr	1957	130	1962	D,S	..	E	.....
5abb	USGS Test hole 3036	330	4.5	Dr	1963	..	....	..	..	...	2,290	L.
6baa	Robert Redland	100	18	Dr	1920+	48.0	7-23-62	N	..	C	.....
6c	E. Twete	172	4	Dr	....	100	1934	N	Sd	...	.....
6dda	Martin Gudvangen	13.02	36	Dv	1957	8.08	7-23-62	S	Gv & Sd	C,H	.....	Ws.
6ddd	..do...	16	..	Dv	1962	11	1962	D,S	..	C,H	.....
7aad	Selmer Salveson	19	30	Dv	1931	12	1962	D	Gv	C,H/E	2,274	Ws.
8ddd ₁	Olney Burtman	288	6-4	Dr	1910	170	1934	N	Sd	...	.....
8ddd ₂	..do...	260	4	Dr	1960	180	1962	D,S	Gv	C,E	.....	Wh.
10caa	Hans B. Olson	239	4	Dr	1960	100	1962	N	Sd & Lig	E	.....
10cab	..do...	25	24	B	....	20	1962	D,S	..	C,H	.....
12b	F. Rotnem	108	5	Dr	....	40	1934	N	Sd	...	.....
13bbb	USGS Test hole 3002	80	1.25	D	1962	32.65	6-13-63	O	..	...	2,257	Td 160, L ₁ T ₃ C.
15adc	John Mobley	14	48	Dv	1956	12	1962	D,S	Sd	C,E	.....	Ws, Lpc.
16acb	Randolph Kettel	270	5	Dr	1959	160	1959	S	Sd	C,E	.....	Wh, L.
16b	Olney Burtman	280	6	Dr	1931	220	1934	N	Sd	...	.....
17dc	Oley Nordness	160	16	B	....	49.4	7-11-47	N	..	...	.....
19a	H. L. Thompson	32	24	B	....	8	1962	D	Gv	...	.....	Wh.
21b	Roy Tracey	202	2	Dr	1912	100	1934	N	Gv	...	.....

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
160-97 Cont.												
21c	P. K. Aarestad	110	5	Dr	....	50	1934	N	..	...	.....
21d	..do...	136	6	Dr	....	40	1934	N	Gv	...	.....
21ddd	..do...	85	6	Dr	....	42	1962	D,S	Gv	S,E	.....	Wh.
22aaa ₁	Roy Tracey	68	4	Dr	1960	30	1962	S	Gv	C,E	.....	Wh, Hp.
22aaa ₂	..do...	12	48	Du	1940	10	1962	N	..	...	.....
22c	P. K. Aarestad	110	24	B	1912	3	1934	N	..	...	.....
23a	G. O. Haugjorde	60	24	B	....	57	1934	N	..	...	.....
25dad	..do...	58	4	Dr	1959	40	1962	D	Gv	E	.....	Wh.
25ddb	..do...	..	24	B	....	23.75	7-20-62	S	Sd	C,E	.....	Wal.
26c	Leonard Berg	127	5	Dr	1924	40	1934	N	..	...	.....
26ccc	..do...	100	3	Dr	.....	25	1962	D,S	..	...	.....
27dcb	Alber Pieper	100	4	Dr	1943	40	1962	D,S	Gv	C,E	.....
28ad	A. L. Burns	85	4	Dr	1914	40	1934	N	Sd	...	.....
28aad	..do...	110	4	Dr	....	85	1962	D,S	Sd	...	.....	Wh.
29dad	Leonard Rosten	110	4	Dr	....	60	1962	N	..	...	.....
32aac	Albert Pieper	140	5	Dr	1961	..	....	N	..	...	.....	L.
32cca	Frank Salveson	140	4.5	Dr	1962	55	1962	N	..	...	.....	L, casing pulled.
32daa	USGS Observation well 3-862	125	1.5	Dr	1962	28.5	7-12-62	O	Sd & Gv	...	2,237	Td 132, L, T ₃ , C.
32dac	USGS Observation well 2-862	142	1.5	Dr	1962	43.9	7-12-62	O	Sd & Gv	...	2,253	Td 147, L, C.
32dca	Frank Salveson	190	4.5	Dr	1962	..	....	N	..	...	.....	L.
32ddb ₁	..do...	138	18	Dr	1962	56.69	9-27-62	irr	Sd & Gv	Tu,E	2,265	Td 140, L, C.
32ddb ₂	USGS Observation well 1-862	134	1.5	Dr	1962	71.40	7-12-62	O	Sd	...	2,265	Td 140, L, C.
32ddb ₃	Frank Salveson	168	..	Dr	1962	..	....	..	..	...	.....	L.
33bbd	Leonard Rosten	160	5	Dr	1961	..	....	T	..	...	.....	L, casing pulled.
34ccc	Theodor Rosten	104	36-4	Dr	....	16.2	7-21-61	N	..	C,E	.....
35cbb	Olaf Thon	110	6	Dr	....	80	1962	D,S	Sd & Gv	C,E/H	.....
36aa	G. O. Haugvorde	60	4	Dr	1910	Flow	1963	N	..	...	.....	Flow 1 gpm 1963.
36cbb	USGS Test hole 3003	98	1	Dr	1962	Flow	1963	N	..	...	.....	Td 320, L, C, Well plugged.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>160-98</u>												
3dda	Morris Sigvaldson	14	48	Dv	1951	11.7	7-23-62	S	Sd	C,E	.....
3ddd	..do...	19	36	Dv	1951	16.7	7-23-62	D	..	E	.....
4cba1	Albert Nystuen	355	5 to 3	Dr	....	40	1948	N	Sd	...	2,146	Wh.
4cba2	..do...	365	4	Dr	1952	80	1962	D,S	Sd	C,E	2,146	Wh, Np.
5ccc1	Gilbert Dahlke	350	4	Dr	1948	100	1948	S	Sd	C,W	.....	C.
5ccc2	..do...	350	5-3	Dr	....	20	1948	N	Sd	...	.....
6ccc	E. C. Gordon	109.5	18	B	....	71.47	8-19-48	N	..	C,H	.....
7cbb	Berger Herland	137.9	6	Dr	....	125.17	8-19-48	D,S	..	C,W	2,160	
8bad	Carl P. Nystuen	360	6	Dr	....	22	1948	N	..	C,W	.....
8dcc	Carl Tweed	35	6	Dr	1957	23.6	7-24-62	D	Sd	E	.....	C.
8dcd	..do...	30	48	Dv	1927	8.2	7-24-62	S	Sd & Cl	H,E	.....
10d	Leroy Tweed	350	4	Dr	1914	115	1934	N	Lig	...	.....
11cdd	Ray Rodgers	318	5-3	Dr	1929	80	1934	N	Sd	C,W	.....
14ccb	Mrs. Bernice Schilke	33	18	B	1940	11.44	7-23-62	S	Sd	C,G	2,271	Wh, Wal, Lpc.
14ccb	Aldrich Gunderson	232	4	Dr	....	142	1962	S	Lig	C,W	2,272	C.
15ddd	Orvin Gunderson	170	4	Dr	1949	..	....	S	Gv	C,E	.....	Wal, Np.
16bcd	Clifford Tweed	295	4	Dr	1948	125	1948	S	Lig	C,E	2,225	Wa (137 ppm).
17aba	David Walen	16	60	Dv	1953	13.07	7-24-62	D,S	Sd	E	2,201	Wh (274 ppm)
18aaa	Mildred Johnson	175	2	Dr	....	140	1948	N	Sd	...	2,194	
18bbc	Wilard Johnson	250	4	Dr	1950	125	1962	D,S	Gv	C,E	2,180	Wh.
18dad	Ole Sateren	263	2	Dr	....	160	1962	N	..	...	2,120	Wh.
20bcc	Jacobson Bros.	273	3	Dr	1948	140	1962	D,S	Lig	C,E	.....	Wh (256 ppm), Wal, Np.
21bac	Otto Moe	253	3	Dr	1947	170	1962	D,S	Lig	C,E	.....	Wh, Wal.
22bac	Tilford Kvale	228	2	Dr	1916	210	1962	N	Gv	C,G	.....	Np.
24acb	Joseph Thvedt	325	3-1,5	Dr	1943	200	1962	D,S	Lig	C,E	2,320	Wa.
24cdd	Nels P. Person	70	24	B	1921	50	1962	N	...	C,W	.....	Wh, Np.
26bdc	Alfred Johnson	90	4	Dr	1947	40	1962	S	Gv	C,W	2,255	Wh.
27adb1	Henry Olson	200	2	Dr	1917	150	1948	N	...	...	.....
27adb2	..do...	207	4	Dr	1956	120	1962	D,S	Sd & Lig	C,E	2,270	Wh.
27add	Melvin Olson	220	4	Dr	1957	100	1962	D,S	...	C,E	2,275	Wh.

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>160-98</u>	Cont.											
29abd	Iver Satern	353	6	Dr	1913	200	1962	S	Lig	C,E	2,262	Wh (563 ppm), Wal, Np.
29acb	..do...	20	36	Du	....	18	1948	D	Sd	C,H	.....	Lpc.
29caa	Theo Linner	200	6	Dr	....	190.32	8-19-48	N	..	...	.....
30dcb	Claude Christianson	242	4	Dr	1917	190	1962	D,S	Lig	C,E	2,239	
31dac	Arthur Christianson	252	3	Dr	1925	180	1962	D	Lig	C,E	2,260	Wh.
32bcc	C.T. Sateren	240	4	Dr	....	200	1948	D,S	Lig	C,W	2,250	
32dcd	Carrie Harstad	115	18	B	1918	95	1948	N	Gv	...	2,270	Wal.
33cdb	Otto Vicha	280	5	Dr	1945	180	1962	S,D	Lig	C,W	2,250	Np.
33dba	D. C. Moe	117	12	B	....	90	1948	N	Gv	...	2,270	
34ddb	Sara Salveson	235	4	Dr	1945	190	1962	D,S	Lig	C,E	2,300	
36ddd	Fred Rossmiller	154	4	Dr	1958	70	1954	D,S	Sd	C,E	2,305	
<u>160-99</u>												
1ddd	Peter Eide	90	18	B	1931	69	1948	N	Sd & Gv	...	2,119	
2bcc	Harvey Koppang	170	2	Dv	....	70	1934	N	Gv	...	2,103	
3aad	Olivene Koppang	80	6	..	....	20	1962	S	..	C,E	.....	Wh.
3bbb ₁	USGS Test hole 3016	115	1.25	Dr	1963	13.57	7-11-63	O	Sd	...	2,045	Td 590, L, T ₃ , C.
3bbb ₂	..do...	330	1.25	Dr	1963	7.98	7-11-63	O	Gv	N	2,045	Td 590, L, T ₃ , C.
5adb	Edmund Eide	36	4	Dr	1951	17	1962	S	Gv	C,E	.....	Wal.
5dba	..do...	36	4	Dr	1951	25	1962	D	Gv	E	.....	Lpc.
6aab	G. H. Anderson	44	3	Dr	....	19.41	8-18-48	N	..	...	2,179	
6bbd	Orvin Eide	47	18	B	1928	35	1962	D	Sd	C,E	2,120	Lpc.
7dbd	Oscar Haugen	115	4	Dr	....	90	1962	D,S	..	...	2,070	Wh.
8ccc	NDWC Test hole 1524	126	5	Dr	1959	..	....	N	..	...	2,250	L.
10abb	C.T. & L.A. Blikre	152	2.50	Dr	....	100	1948	N	..	...	2,170	
11bbb	Ed. Myhre	243	2	Dr	1917	143	1934	N	Lig	...	.....
12bbb	Paul Siem	144	4	Dr	1934	94	1962	D,S	..	C,W	2,140	Wh.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
160-99 Cont.												
12ad	Paul Siem	144.5	6	Dr	....	132.34	8-9-48	N	..	...	2,175	
13bcd	H. Swenson	170	2	Dr	1915	120	1962	D,S	Gv	...	2,171	
14d	..do...	170	2	Dr	1918	135	1934	N	Gv	...	.....
17c	Ingwold Mork	194	3-2	Dr	1927	24	1934	N	Gv	...	.....	Wh.
17ccb	..do...	49	4	Dr	1951	46	1962	D	Gv	J,E	.....	Lpc.
17ccc	..do...	247	4	Dr	1958	57	1962	S	Gv	C,E	.....
19cbd1	Arthur Haugen	23	4	Dr	1955	5	1962	D	Sd	C,H	2,179	
19cbd2	..do...	12	36	Dv	1958	7	1962	..	Gv	C,H	.....
19dcd	Lester Johnson	160	4	Dr	1921	120	1959	D,S	..	...	2,134	C.
20add	Peter Nygaard	282	3	Dr	1923	200	1962	N	Gv	...	2,140	
21d	Roy Hagen	198	6	Dr	1915	123	1934	N	Gv	...	.....
23bbc	Mrs. Clara Detke	262	3	Dr	1949	160	1949	D,S	..	C,E	2,186	Wh.
24dcd	J. M. Anderson	280	4	Dr	1916	200	1934	N	Gv	...	2,120	
25aca	Alfred Renner	290	2	Dr	1910	80	1962	D,S	Lig	...	2,198	Cc.
26aac	Bernt Simle	275	5	Dr	1916	175	1962	N	Lig	...	2,239	Wh.
26cdb	John Monger	207	5	Dr	....	180	1948	N	Sd	...	2,181	
26ddc	Bernt Simle	202	..	Dr	1916	172.5	7-26-62	N	..	N	2,222	Ws.
27aba	V. L. Anderson	223	5	Dr	1916	170.32	8-18-48	N	..	...	2,204	
28cbd	Lawrence Hagen	90	7	Dr	1950	60	1962	S	Gv	Sub,E	2,120	Wh.
28dda	Roy Hagen	170	4	Dr	1915	60	1962	N	Gv	C,E	2,172	Wh.
29bad	A. Holgerson	18	36	Du	....	10.65	8-17-48	N	..	...	.....
29bbb	NDWC Test hole 523	420	5	Dr	1959	..	....	N	..	...	2,100	L.
32cdd	Oscar Johnson	93.5	6	Dr	....	52.01	8-17-48	N	..	...	2,103	
32ddb	Melford Johnson	180	4	Dr	1916	50	1962	D,S	Sd	C,E	2,118	Wh.
33cba	Oscar Johnson	16	48	Du	....	12	1962	S	..	C,H	.....
33ebb	..do...	12	36	Du	1950	8	1962	D	Cl	P,E	Ws
35aad	Bert Simle	250	4	Dr	1916	181.47	8-19-48	N	Gv	...	2,220	

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>160-100</u>												
1adb	V. Thveit	40	12	B	25.31	8-18-48	N	
2aab	Lewis Moen	154	4	D	1961	130	1961	D,S	Sd	C,E	
4aab	Julian Wroson	spring	..	.	....	Flow	1962	..	..	..	.....	Wh.
4ccd1	..do...	70	3	D	1950	43	1950	D	Sd	J,E	.....	Wh (650 ppm).
4ccd2	..do...	70	18	B	....	40	1962	S	..	C,E	2,171	
4ddc	..do...	155	4	D	1918	0.95	1948	N	Sd	...	2,150	Wal.
4ddd1	Obert Berg	64	4	D	1940	45	1962	D	Gv & Lig	N	.....
4ddd2	..do...	164	5	D	1959	..	....	N	Sd & Lig	C,E	.....	Wh.
5dba	Edmund Eide	Spring	..	..	....	Flow	1962	..	..	..	.....	Yields 2-5 gpm.
6ddd	Willie Westin	80	5	D	....	70	1962	D,S	..	C,E	2,200	Wh.
7bcc	A. R. Ternquist	120	4	D	1960	100	1960	D,S	Sd	Sub, E.	.....	Wh (274 ppm).
8acb	Julian Wrolson	50	5	Dr	1915	38	1938	S	Sd	C,W	2,192	Wh.
10ad	Murrell Knudsvig	202	4	Dr	1927	82	1934	N	Gv	...	.....
10adc	..do...	60	4	Dr	1955	53	1962	D,S	Sd & Gv	Sub, E	.....
13aaa	John N. Knudsvig	65	4	Dr	1935	59	1962	D,S	Gv	E	.....
15cbb	Ole Karlsrud	63	5	Dr	1952	48	1962	D	Sd	E	2,090	
15cbc	..do...	40	18	Dr	....	25	1962	S	..	C,E	.....	Wh.
17aba	Willie Westin	100	4	Dr	....	70	1962	N	..	C,H	2,120	Wal.
17acb	P. J. Foss	100	5	Dr	1917	93	1962	D,S	Sd & Gv	C,E	2,157	C.
19cdd	T. & C. Bendixson	26.80	24	B	...	13.28	8-17-48	N	..	...	2,080	
20bc	H. H. & M. L. Bublitz	230	6-3	Dr	1923	225	1934	N	Sd & Lig	...	.....
20ccd	Eldon Boeck	53	4	Dr	....	25	1957	D,S	Sd	...	2,100	Wh (574 ppm).
22dda	Soren Sorenson	17	30	Du	....	6	1962	S	..	C,E	2,046	Ws, Wal.
23cca	..do...	28	54	Du	1951	14	1962	D	Sd	E	.....	Wh.
27bbb	Elmer Amundson	90	4	Dr	....	40	1962	D,S	Sd	C,E	2,171	Wh.
28dda	Clifford Amundson	18	5	Dr	....	13	1962	D	..	...	.....
31bcc	Clayton Ternquist	54.7	6	Dr	....	28.13	8-16-48	N	..	...	.....
31ccb	Alfred Jorstad	96	5-4	Dr	....	83	1962	D,S	Gv	J,E	.....	Wal, Lpc.
31ccc	George Stewart	164	5	Dr	1928	124	1962	D	Gv	C,E	2,114	

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>160-100</u> Cont.												
32caa	S. C. Stewart	126	4	Dr	1961	78	1961	D,S	Sd	Sub,E	2,080	Wh (718 ppm), Wal.
32ebb	Alfred Jorstad	105	4	Dr	1930	75	1948	N	Gv	...	2,090	Wal.
33dcd	Ed. C. Nelson	85	5	Dr	....	55	1962	D,S	Sd	C,E	2,052	Wh.
34bbd	Bernt Amundson	18	8	Du	....	9	1962	S	Sd	C,E	.....
34ccc	Even Ulledal	71	18	B	1943	50	1962	D,S	Gv	D,S	2,070	Wh (1,110 ppm), Lpc.
35aba	Ole Holm	35	5	Dr	1958	15	1962	S	Sd	C,E	.....	Wh.
36bcc	..do...	Spring	..	..	....	Flow	1962	N	..	...	.....
<u>160-101</u>												
1aaa	Raymond Sletten	87	6	Dr	1916	82	1961	S	Gv	C,E	2,220	Wh.
1bcc	Frank Eberle	95	6	B	1916	75	1934	S	Sd	...	.....
3aaa	USGS Test hole 3030	170	4.5	Dr	1963	..	....	N	..	...	2,200	L.
3ddd	Oscar Bendixson	64	24	B	....	50	1962	D,S	..	Sub,E	2,205	Wh (714 ppm).
9c	Lyle M. Nelson	160	4	Dr	1916	115	1934	N	Sd	...	.....
9ddd ₁	..do...	120	24	B	1913	100	1962	S	Gv	...	.....	Wh.
9ddd ₂	..do...	50	24	..	....	24	1962	S	..	E	.....	C.
9ddd ₃	..do...	380	4	Dr	1963	100	1964	S	..	E	.....	C.
11baa	Frank Eberle	91	4	Dr	1958	65	1962	D	Gv	Sub,E	2,212	Wh, L.
11cca	Clara Bendixson	27	12	Du	....	14.65	8-1-62	D	Gv	E	.....	Ws.
11ccc	..do...	135	24	B	1913	100	1962	S	Sd	C,E	2,240	Hp, Lpc.
11ccd	..do...	170	4	Dr	1962	80	1962	S	Sd	Sub,E	2,240	
12baa	Fred Eberle	90	18	Dr	....	72	1962	D,S	Gv	E	2,215	Ws.
13ccd	Wallace Thompson	40	24	Dr	1916	20	1962	D,S	Lig	C,E	2,140	Wh (274 ppm).
14cdb	Theodore Nelson	48	24	Dr	1928	40	1962	D	Sd	C,E	2,215	Wh.
14ddd	Wallace Thompson	Spring	..	..	....	Flow	1962	S	..	...	.....
15a	C. B. & Thelma Astrup	110	5	Dr	1920	90	1934	N	Cl & Sd	...	.....	Hp.
17bcd	Edwin Dordahl	170	4	Dr	1949	..	....	S	..	C,E	.....
18ccc	..do...	8	48	Du	1942	2	1962	D	Sd	C,E	Ws.
19ccd	Franz & M. O. Berg	140	24	B	1916	70	1934	N	Lig	

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>160-101</u> Cont.												
22a	C. A. Davis	100	24	B	1916	70	1934	N	Cl & Sd	
23bac	Harvey Boeck	42	24	B	30	1962	D	Sd	C	2,187	
25ecc	Raymond Sletten	244	4	Dr	1961	80	1961	S	Lig	C,W	2,145	
25ddb	Ole Sletten	71.45	24	B	....	61.38	8-17-48	N	..	...	2,127	
26cdc	Carl Holman	286	3	Dr	1918	87	1934	S	Lig	C,E	2,235	Wh, Np.
26cdd	..do...	32.6	24	Du	....	14.2	7-30-62	N	..	N	.....
27cdb	Vernon Nelson	60	24	B	1926	50	1962	S	Gv	C,E	2,250	Lpc.
27add ₁	Olar Larson	44.9	18	Dr	1955	28.1	7-30-62	D	..	E	.....
27add ₂	..do...	190	4	Dr	....	..	....	N	..	C,N	2,232	Wh, Np.
28cba	Palmer Solheim	110	24	B	....	50	1962	S	Lig	C,E	2,285	Np.
29ada	L. M. Nelson	113.4	6	Dr	1910	60	1962	N	Lig	C,H	.....
29bbb	Borghild Sandvold	175	4	Dr	1930	70	1962	S	Sd	C,E	.....	Wh, Np.
32aaa	Ivan M. Olson	105	6	Dr	....	60	1962	N	..	...	.....	Np.
32bad	Kenneth Storhaug	235	4	Dr	1956	50	1962	S	Sd	Sub,E	.....	Wh.
33add	C. M. Foss	83	10	B	1915	40	1962	S	Sd	C,W	.....	Wh, Lpc.
34a	Magnus Rodvold	100	24	B	1923	90	1934	N	..	...	.....
34b	Anne Johnson	105	5	Dr	1912	55	1934	N	..	...	.....
<u>160-102</u>												
2ada	Carl Storseth	98	24	B	1930	50	1962	D	Gv	C,E	.....	Wh.
3bab	USGS Test hole 3028	400	4.5	D	1963	..	....	N	..	...	2,118	L.
6abb	USGS Test hole 3027	385	4.5	Dr	1963	..	....	N	..	...	2,069	L.
6add	C. H. Larson	65	24	B	1918	13	1934	N	Gv	...	.....
8ccc	Elmer Pedersen	55	24	B	....	20	1962	D	Gv	C,E	.....	C.
9aac	Joe Friestad	22	24	Du	1912	3.0	8-1-62	D,S	Sd	C,H	.....	Wh.
11cbb	Vern Tveten	90	18	Dr	....	50	1962	S	..	C,E	.....	Np.
13ba	John Dordal	300	5-4	Dr	1914	160	1934	N	..	...	.....
15adb	Anna Hagen	40	24	B	....	23	1962	S	..	C,E	.....	Wh (1540 ppm).
17ada	Hans Nelson	150	4	Dr	....	100	1962	S	Lig	...	.....	Wh.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>160-102</u> Cont.												
18ccc	USGS Test hole 3005	300	4.5	Dr	1963	..	....	...	..	...	2,039	L.
22bbd1	Arne Nelson	308	4	Dr	1956	100	1962	D,S	Lig	Sub,E	.....	Wh (714 ppm).
22bbd2	..do...	9	36	Du	....	7	1962	D	Gv	...	.....	Ws.
22cbc	John Storseth	135	4	Dr	1960	80	1962	D,S	..	Sub,E	.....	Wh (1025 ppm).
22cbd	..do...	98	18	B	1917	40	1962	D,S	..	J,E	.....	Wh (1370 ppm), lpc.
24d	..do...	60	24	B	....	56	1934	N	..	...	.....
25ddd	Irving Ellevold	50	24	B	....	30	1962	N	Gv	...	.....	Wh.
26aaa	USGS Test hole 2249	136	4.5	Dr	1964	..	....	N	..	...	2,211	L.
27bbb	John Storseth	21	24	..	....	8	1962	N	Sd	...	.....
31bbc	Earl Johnson	16	48	Dug	....	14	1962	S	Gv	...	.....	Wh.
32aaa	Nels Christianson	135	4	Dr	1960	90	1962	D,S	Sd	E	.....	Ws.
32b	Engvald Sneva	140	4	Dr	1925	75	1934	N	Sd	...	.....
32dda	..do...	125	4	Dr	....	60	1962	S	Sd	...	.....	Wh.
33bdb	Alvin Twete	70	4	Dr	1956	65	1962	D,S	Gv	C,E	.....	Wh.
33cac	Art Bergeron	12	24	Du	....	4	1962	S	..	...	.....	Ws.
35cac1	Melvin Schenstad	68	4	Dr	1956	58	1962	D	Sd & Gv	E	.....	Wh (1370 ppm), lpc.
35cac2	..do...	130	24-18	B	....	91.5	8-2-62	S	..	C,E	.....	Wh, Wal, lpc.
35daa	Ernest Schenstad	70	19-12	..	....	15	1962	N	..	...	.....
<u>160-103</u>												
1aaa	Albert Pedersen	28	4	Dr	1962	Flow	1962	D	Sd & Gv	E	.....	Wh.
1bcc	Walter Quam	114	5	Dr	1923	3.2	8-2-62	S	..	N	.....	Wal, Np.
2bbb	USGS Test hole 3026	405	4.5	Dr	1963	..	....	N	..	..	2,032	L.
4aaa	E. A. Sneva	100	4	Dr	1921	30	1934	N	Gv	..	.....	Wh.
4cdc	Albert Sonstegard	80	24	B	1908	60	1962	N	Sd	..	.....	Wh.
5aaa	USGS Test hole 3025	200	4.5	Dr	1963	..	....	N	..	...	2,098	L.
5aad	Hans H. Haugen	120	4	Dr	1961	70	1962	D	Sd	C,H	2,095	C.
5c	Gerhard Sneva	75	24	B	1910	55	1934	N	..	...	.....
5ddd	..do...	90	3	Dr	1957	60	1962	D	Sd	E	.....	Wh, Wal.
9d	H. Anderson and H. E. Brown	70	4	Dr	1922	Flow	1934	N	Sd	N	.....

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>160-102</u> Cont.												
11ced	Andrew Burkhov	..	4	Dr	1961	Flow	1962	D	Sd	...	Flows	15 gpm, 42° F.
12dad	Ansel Jacobson	48	3	Dr	....	11	1962	D	..	....	Wh.	
13baa	Anna Spaberg	52	24	B	....	25	1962	N	..	....	Wal.	
14b	Andrew Burkhov	45	24	B	1929	Flow	1934	N	Sd	....	Flowed 9 gpm in 1934.	
16bbb	USGS Test hole 3082	105	1.25	Dr	1963	43.68	11-12-63	O	Sd & Gv	....	2,052	Td 270, L, T ₃ , C.
17bbb	P. C. Jensen	101	4	Dr	1926	46	1934	N	Sd	....	....
20c	H. & N. Jacobson	80	5	Dr	1919	73	1934	N	Sd	....	....
20ded	USGS Test hole 3081	185	4.5	Dr	1963	..	....	N	..	....	2,044	L.
22c	J. C. Jensen	40	24	B	1929	33	1934	N	Sd	....	....
24ddd	William A. Nelson	50	24	B	....	45	1962	D,S	..	....	....	Wh.
27cdd	Adolph Sneva	39	18	B	1943	35	1962	D,S	Sd	C,E	....	Wh, Lpc.
27dcc	..do...	40	18	B	1943	35	1962	D,S	..	C,E	....	C.
34ada ₁	Ernest Jenson	40	24	B	1955	20	1962	S	Gv	C,E	....
34ada ₂	..do...	60	18	Dr	1960	40	1960	N	Sd	N	....	Wh.
34d	R. A. Jensen	130	3	Dr	....	20	1934	N	Sd	....	....
<u>161-25</u>												
1bbc	Theo. Johnson	275	4	Dr	....	214.0	8-24-62	N	Lig	N	2,360	Wh.
2bac	Willie Brodal	285	5	Dr	1916	200+	1962	S	..	C,W	2,320	Wh.
2dda	Allen Spooner	270	6	Dr	1913	170	1962	S	..	C,W	2,380	Wh.
3aba	Willie Brodal	415	4	Dr	....	213.0	8-24-62	N	..	C,N	2,325	Wh.
4aaa	E. O. Pederson	243	5-3	Dr	1917	200	1962	N	Lig	C,N	2,230	Wh.
7ada	Glen Haroldson	202	5	Dr	....	0.5	8-25-62	N	..	....	2,380	
7dcc	Roy Fenster	170	4	Dr	....	120	1962	D,S	..	....	2,390	
8add	Fred Fredrickson	20	8	B	....	15	1962	D	Cl	C,H	....	Wh, Lpc.
11bcb	Adolph Brodal	317	5	Dr	1917	180	1962	N	Lig	C,N	2,345	Np.
12abc	Roland Zimmerman	257	5	Dr	....	7	1962	S	..	C,E	2,395	C.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
161-95 Cont.												
13ccb	Ray Roberts	80	18	B	....	16.30	8-24-62	N	..	C	2,375	Wh.
14ada1	Kenneth Melgaard	94	18	B	1911	80.0	8-24-62	N	..	N	2,400	Wal, Np.
14ada2	..do...	35	18	B	....	10.5	8-24-62	N	..	N	.....
15cbb1	Wm. Heuer	75	18	B	....	60	1934	N	Sd	...	.....
15cbb2	..do...	42	18	B	1920	20	1962	D,S	Gv	CW/E	2,370	Wh.
17ddd	Peter & Eric Heuer	30	12	B	1937	16	1962	D,S	Sd	CW/E	2,345	C.
18dda	Floyd Fenster	12	48	Du	....	6	1962	D,S	..	C,E	.....	Lpc.
20ddd	Lambert Nelson	49.7	18	B	....	10.5	8-25-62	N	..	C,N	.....	Lpc when used.
21dba	William Heuer	93.0	12	B	....	57.6	8-25-62	N	..	N	.....
22cdd	Clarence Bratlien	40	24	B	....	17	1962	S	..	...	.....
22ddd	E. Haugen	315	4-2.5	Dr	1918	250	1934	N	Sd	...	.....
23aba	K & I. M. Gilvertson	33.0	12	B	....	15.1	8-24-62	N	..	N	.....
23bbd	Alfred Ellison	41.1	18	B	1947	9.1	8-24-62	S	..	C,H	.....	Wal, Lpc.
24cc	Ted Bratlien	80	24	B	1921	..	....	N	Gv	...	.....
24ccd	..do...	15	8	B	1957	6	1962	D	Cl	P,H	.....	Wal.
25ccd	Oscar H. Kjelshus	21.1	36-24	Du	1960	13.0	8-24-62	D	Cl	J,E	.....	Wh, Lpc.
26baa1	Leonard Bratlien	12	30	Du	1960	6	1962	S	Sd	C,E	.....	Wh, Lpc.
26baa2	..do...	210	4	Dr	1910	164.0	8-24-62	N	Sd	...	.....	Wh.
26cdd	Ole Jaraanstad	331	3	Dr	1920	200	1962	S	Gv	C,G	.....
29cdc	Martin Bakken	22	24	B	....	4	1962	S	Sd	C,E	.....	Wh, Lpc.
30cbb	Caroline Roestel	176	4	Dr	1918	158	1934	N	Gv	...	.....
31bcb	Chester & Milton Fenster	187	4	Dr	1917	157	1934	D,S	Gv	C,W/H	.....	Wh.
32ccc	M. M. Martin	33.0	24	B	....	18.6	8-25-62	N	..	N	.....
33ccd	Sophee Broby	220	4-2.5	Dr	....	130	1962	D,S	Gv	C,E	.....	Wh.
33ddd	USGS Test hole 3039	320	4.5	Dr	1963	..	....	N	..	...	2,359	L.
35dcb	Jacob Skarphol	14	48	Du	1946	7	1962	S	Gv	C,H	.....	Wh.
35dda	..do...	23	18	B	1944	17	1962	D	Gv	C,H	.....	Wh, Lpc.
36ccc	Oscar Kjelshus	18.4	12	Du	....	6.9	8-24-62	N	..	N	.....	Wh.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
161-96												
2acc	Hanna Shirley	273	5	Dr	1917	18	1934	N	..	...	.....
2ccc	Hayden Lampert	40	17	B	1943	30	1962	D	Sd	C,E	.....	Wh, Lpc.
2ddc	Clayton Myhra	276	4	Dr	....	90	1962	D,S	..	...	.....
9bbc	Art Espeseth	200	5	Dr	1912	120	1962	S	..	C,G	.....	Wh.
10ada	Ernest Gochanour	15.3	24	Du	....	11.2	8-20-62	S	..	C,H	.....
10bbb	John Pharoah	139	4	Dr	1958	60	1958	D,S	Gv & Cl	...	.....	Wh, T, 43°F.
11ccc	R. M. Fagerland	38	16	B	1942	24	1962	D,S	Gv	J,E	.....
11ccd	..do...	28	16	B	1942	8	1962	N	..	N	.....	Wh.
14bab	Roy Espeseth	46	24	B	1945	36	1961	D,S	Sd	C,E	.....	Wh.
15dda	Joseph Jygaard	18	24	B	1937	8	1962	S	Gv	C,G	.....	Wh.
17bcd	Alvin Lervick	265	4	Dr	....	180	1962	S	..	C	2,365	Wh, Np.
18abc	Clifford Nesje	312	4	Dr	1949	240	1962	D,S	..	E	2,370	Wal, Wh.
19cbb	Harry Berg	28	12	B	....	15	1962	S	..	C,H	.....	Wal, Lpc.
20cdd	Elvan Gilland	20	36x48	Du	....	12	1962	N	..	N	.....	Wh.
23add	Elof Dalin	175	6	Dr	....	138	1962	D	..	C,W	2,340	Wh.
23bbc1	Engvald Christianson	195	4	Dr	1956	70	1956	N	Gv	N	2,360	L.
23bbc2	..do...	210	4	Dr	1963	61.88	5-12-64	D,S	Gv	Sub,E	2,356	C.
24aaa	Oral Sillerud	38	6	..	....	20	1962	D,S	..	...	.....	Wh.
24bac	Palmer Pederson	120	6	Dr	....	30	1962	D,S	..	C,W/H	.....	Wh.
25ccb	Otis Glasoe	330	4	Dr	1957	150	1962	D,S	Sd & Lig	Sub,E	.....	Wh, Fe (9 ppm).
26aaa	Otto Glasoe	186	5	Dr	....	176	1962	D	..	...	.....	Wh.
27cdc	Alma Rivers	24	18	B	....	4	1962	D	Sd	C,E	.....	Ws.
29dcb	Theo Schilke	16.2	24	B	....	13.0	8-21-62	D,S	Gv	C,E	.....	Wh, Lpc.
31bbd	Kenard Glasoe	33.2	18	B	1948	12.7	8-21-62	D,S	Gv	C,E	.....	Lpc.
32adc	Ernest Gillund	7.6	42	Du	....	5.4	8-21-62	S	Gv	Gen,E	.....	Lpc (pc 20 gpm).
32bba	Palmer Ouren	60	18	B	....	10	1962	D,S	..	C,E	.....	Wh.
32ccc	USGS Test hole 3037	380	4.5	Dr	1963	..	....	N	..	...	2,358	L.
33bba	E. Gilland	33.4	24	B	1945	14.2	8-21-62	D,S	Sd	C,E	.....	Wh, Lpc.
33cdb	Olaf Thone	37.0	12	B	....	35.1	8-21-62	N	..	N	.....
34bab	S. Grove	37	12	B	1957	20	1962	D,S	Sd	C,E	.....	Wh, Wal, Lpc.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>161-96</u> Cont.												
35dce	Martin Horstad	324	3	Dr	1936	124	1936	D,S	Lig	C,E	.....	Ws.
35ddd	USGS Test hole 3038	330	4.5	Dr	1963	..	....	N	..	...	2,345	L.
<u>161-97</u>												
1cbb	Lloyd Olin	430	6-4.5	Dr	1915	300	1962	N	Lig	C,W	2,172	Ws.
2daa	Herbert Olin	323	6	Dr	1912	110	1962	D,S	Lig	Sub,E	2,150	Wh.
3c	Frank Kirchoffer	175	6	Dr	....	30	1934	N	Gv	...	.....
3dad	Eddie Bummer	83	1.8	B	....	64.1	8-20-62	D,S	Gv	E	2,110	Wh (2390).
4aa	J. T. Ebreck	80	1.8	B	1926	60	1934	N	Sd	...	.....
6cdd	Gilbert & Lila Olin	100	4	Dr	....	48.06	7-9-47	N	Gv	C	2,070	
7ccd	T. N. Jorgenson	225	2	Dr	....	120	1962	D,S	Sd	C,G	2,080	Wh.
8cdcl	Melvin Wenstad	135	6	Dr	....	44.95	7-11-47	N	Sd	...	2,091	
8cdc ₂	..do...	108	4	Dr	1955	60	1962	D,S	Gv	C,E	2,091	
9d	Frank Kirchoffer	360	6	Dr	....	100	1934	N	..	...	.....
11c	Lloyd Olin	275	5-4	Dr	....	225	1962	N	Sd	...	.....
11dab	Walter Mynra	185	5	Dr	1914	160	1962	D,S	Sd	C,E	2,200	Wh.
12dad	Kalmer Unhjem	300	4	Dr	....	85	1962	D,S	Gv	C,E	.....	Wh.
13dcd	John H. Hall	14	9	Dr	1956	8	1956	D	Gv	C,H	.....	Lpc.
15ccc	Mike Corman	300	2	Dr	1920	150	1962	N	Sd	N	2,200	Wh, Wal.
15abd	Henry Hall	170	5	Dr	....	110	1934	N	Sd	..	.....
16ad	Luella Torgerson	300	4-3	Dr	1920	150	1962	N	Sd	C	2,181	Wh.
17dcc	A. U. Anderson	155.0	12	B	1912	42.50	8-18-62	N	Gv & Cl	C,N	2,110	
18dda	Calmer Wenstad	160	4	Dr	....	27	1962	D	G	C,E	2,102	Wh, Wal.
19bbb	K. A. & L. Ottison	100	4	Dr	....	10	1947	N	Gv	...	.....
19dad	Otto Redlin	87	18	B	1916	76.7	7-11-47	N	Sd	...	2,138	
20aba	Glen Hay	150	5	Dr	1908	70	1962	D,S	Gv	C,W	2,112	C.
21add	Bob Redlin	40	18	B	....	Flow	8-20-62	N	..	C,N	2,188	Wh, Wal.
21cc	R. H. & Ronald Points	78	18	B	1915	48.74	7-11-47	N	..	...	2,150	
21ccd	..do...	71.0	12	B	....	21.0	8-18-62	N	..	C,H	2,150	

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>161-97</u> Cont.												
23a	E. & B. Gillund	76	18	B	1924	73	1934	N	Sd	...	.....
24ddc1	Melvin Mortenson	120	12	B	....	100	1962	N	Gv	...	2,300	Wh, Wal.
24ddc2	..do...	60	18	B	....	15	1962	N	Gv	...	.....	Wh, Wal.
26dda	Roy Howard	279	6	Dr	1959	108	1959	D,S	..	...	.....	Wh.
29bbb1	Rolland Redlin	112	18	B	1914	82.87	7-11-47	N	Sd & Gv	...	2,144	
29bbb2	..do...	130	4	Dr	1952	75	1962	S	Gv	C,E	2,140	
29bbb3	..do...	128	4	Dr	1950	75	1962	D	Sd	C,E	.....	Wh.
30aaa	Otto Redlin	127	12	B	1915	67	1962	D,S	Sd	C,E	2,150	Wh, Wal.
31aad	Charles Bissonette	103	18	B	1920	39.45	7-11-47	N	Gv	...	2,192	
31bcc	Donald Moe	9.8	36	Du	....	6.3	8-18-62	D,S	..	E	.....	Lpc.
31ddd	Charles Bissonette	90	12	B	1910	29.6	8-18-62	D,S	Gv	Jet,E	2,200	Wh.
32ccc	USGS Test hole 3034	420	4.5	Dr	7-63	..	....	N	..	...	2,197	L.
32cdc	Charles Bissonette	28.4	18	B	1908	17.60	8-18-62	N	Cl	...	.....	Wh.
35ddd	Roy Howard	302	6	Dr	1930	..	....	N	..	C,H	.....	Wh.
<u>161-98</u>												
1add1	A. L. Murphy	105	6	Dr	1908	40	1934	N	Sd	...	.....
1add2	..do...	92	12	..	1948	27.1	8-17-62	D,S	Sd	C,E	.....
2bbb	Nathan Lindsey	28	72	Du	....	3	1962	D,S	..	...	.....	Wh.
3c	J. B. & A. Johnson	500	5	Dr	....	30	1934	N	Sd	...	.....
3cdd	..do...	350	4	Dr	....	100	1934	N	Sd	C,N	2,090	Lpc when used.
3dda	..do...	14	48	Du	1951	11.66	7-23-62	S	Sd	C,E	.....	Lpc.
3ddd	..do...	18.59	36	Du	1951	16.74	7-23-62	D	Sd	E	.....
6aad	Jacob Stenson	90	18	B	1950	40	1959	D,S	..	C,W	.....
6ada	..do...	88	4	Dr	1958	48	1962	D,S	Gv	C,E	2,140	Wh (1025).
6cbb	Oscar Palm	265	3	Dr	1932	90	1962	D,S	Sd	C,W	2,180	Wh.
7ddd	C. A. Herberg	26	18	B	1948	14	1962	N	..	C,H	.....
9aac	Tina Fjelstad	325	2	Dr	1912	110	1962	D,S	2,100	Wh.
9ccb	NDWC Test hole 1528	378	4.5	Dr	1959	N	2,100	L.

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
161-98	Cont.											
10abb1	J. B. & A. Johnson	100	18	B	1907	80	1959	D,S	Gv	C,W	2,090	Wal.
10abb2	..do...	60	8	B	....	50	1962	D,S	..	C,E	2,095	Wh.
11ccc	USGS Test hole	500	4.5	..	....	55.0	1947	...	..	N	2,077	L, MB.
11adc	E. P. Thompson	80	12	B	....	47.9	8-17-62	N	Gv	N	2,071	
12aaa	Alex & Leo Murphy	95	4	Dr	1908	45.35	7-9-47	N	Sd	...	....
12bcc	P. A. Jacobson	465	4-1.5	Dr	1918	10	1934	N	Sd	...	2,070	
13bab	Alfred & M. J. Joyce	60	18	B	1925	26.27	7-9-47	N	Gv	...	2,050	
14abb	Janette Bureson	75	18	B	....	40.50	7-9-47	N	..	C,H	2,071	
14bdd	..do...	20	12	B	....	..	....	D	..	C,H	....	Lpc.
14dcd	NDWC Test hole 1526	493	..	Dr	1959	..	....	N	..	...	2,070	L.
15bbb	H. B. Burrows	130	4-3	Dr	1914	30	1934	N	Gv	...	2,085	C.
15bbc	NDWC Test hole 1527	320	4.5	Dr	1959	..	....	N	..	...	2,080	L.
17aaa1	Duane Lindsey	35	36	Du	1934	25	1959	D,S	Sd	C,E	....	Wh, Lpc.
17aaa2	..do...	23	36	Du	1946	8	1962	D	Sd	Gen,E	....	Wh.
17aaa3	..do...	26	72	Du	1957	11	1962	S	Sd & C1	C,H	....	Lpc.
17aaa4	..do...	13	48-72	Du	1961	10.7	8-17-62	D,S	Sd	Gen, E	....
18add	Benney Nelson	245	4	Dr	....	80	1962	D,S	..	C,E	....	Wh.
20aaa	A. M. Nelson	160	3	Dr	....	158	1934	N	Sd	...	2,063	Yielded 2 bbls per day.
20bbb1	Nels Sandberg	224	4-2	Dr	1916	55	1962	D	Sd	C,E	2,081	Wh (342 ppm), Wal, Np,C.
20bbb2	..do...	96	18	B	1914	7.64	8-17-62	D	..	C,H	2,083	C.
20dcd	Duane & Thelma Lindsey	132	3	Dr	1931	100	1934	N	Sd	...	2,070	
21ccc	Kenneth Hall	98	6	Dr	....	30	1962	S	..	...	2,068	Wh.
21dca	O. B. Storaali	85.0	2	Dr	....	33.3	8-17-62	N	..	...	2,060	
22aaa1	L. S. & Sophie Goldal	90	5	Dr	1914	50	1934	N	Sd	...	....
22aaa2	..do...	65	6	..	....	33	1962	D,S	..	...	2,075	
23bdd	Dwaine Egge	40	24	B	1915	23.01	7-10-47	N	..	...	2,060	
23caa	..do...	50	24	B	....	20.55	6-13-59	D	..	C,H	2,060	
24aad	Milly Loucks	39	18	B	1913	Flow	1962	D	Gv	...	2,060	
24baa	C. W. Bentson	90	24	B	1906	16.08	7-10-47	N	Sd	...	2,045	

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>161-98</u> Cont.												
25aad	C. W. Bentson	380	4	Dr	1910	16	1962	D	Sd	...	2,112	
26cc	F. Hatfield & Clyde Died	300	..	Dr	....	220	1934	N	Sd	...	.....
27bbb	USGS Test hole	60	4.5	Dr	1947	6.43	6-28-47	N	..	...	2,030	L, MB.
28aaa	USGS Test hole 3088	415	4.5	Dr	1963	..	....	N	..	...	2,030	L.
28dad	Frank Schell	30	24	B	1920	20	1962	D	Gv	C,E	2,080	Wh.
29c	P. Paulson	160	5	Dr	1916	60	1934	N	Sd & Lig	...	.....
30aaa	Gordon Hall	68	18	B	....	24	1962	D,S	..	E	.....	Wh.
30aba	..do...	21	18	B	1946	9.16	7-10-47	N	Gv	...	2,055	
34dcd	USGS Test hole 3035	240	4.5	Dr	1963	..	....	N	..	...	2,100	L.
35d	Albert Nystuen	150	16	B	1914	50	1934	N	Gv	...	.....
<u>161-99</u>												
1bab	Clarence Thompson	205	3-2	Dr	1928	114	1962	D,S	Sd	E	.....	Lpc, C.
3da	Knute Kvigne	485	5-2	Dr	1917	25	1934	N	Sd	...	.....
3dad	..do...	133	3	Dr	1941	30	1962	D,S	..	C,W/E	.....
4aac	Curtis Tangedal	39.8	..	.	....	20.60	8-13-62	S	..	CH	.....
4d	Bert Thompson	127	13	B	1913	107	1934	N	Gv	...	.....
5abb	Fred Long	31.4	..	B	....	22.54	9-6-62	N	..	C,H	.....
5baa	..do...	Spring	..	.	....	Flow	1962	..	..	...	.....	Yield 3 gpm, Wal, T 51°F.
8ccc1	Edmond Johnson	30	12	B	1948	18	1962	D	Gv	E	.....	Wh (1710 ppm).
8ccc2	..do...	15	24	B	1933	10	1962	D	..	C,W/H	.....	Wh, Lpc.
8ccc3	..do...	26	18	B	1958	5.5	8-14-62	S	..	C,E	.....	Wal, Lpc.
9bbb ₁	Sigurd Hofstad	60	16	B	....	30	1962	S	Sd	C,G	.....	Wh.
9bbb ₂	..do...	30	24	B	1945	24	1962	D	Gv	C,H	.....
11aa5 ₁	Orville Knutson	250	4	Dr	1957	180	1962	D	Sd	...	.....
11aa5 ₂	..do...	200	3	Dr	1933	78.0	1962	N	Sd	...	.....
12b	Hannah Fordahl	192	4	Dr	1926	80	1934	N	Sd & Gv	...	.....
12cdd	Thorston Karlberg	10	42	Du	1947	6	1962	D	Sdy & Cl	C,H	.....	Np, Lpc.
13add	Frank Lindberg	243	3	Dr	1928	35	1934	N	Sd	C,H	.....

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
161-99 Cont.												
14daa	Leonard Ledahl	240	3-2	Dr	1927	70	1934	N	Sd	...	.....
15bec	Gordon H. Hasselstrom	11.7	48	Du	1910	7.4	8-14-62	N	Gv	C,H	.....
15bcc	..do...	21.1	48	Du	1938	13.3	8-14-62	D	Gv	C,E	.....	Lpc.
15cd	Curtis Solberg	486	3-2	Dr	1918	80	1934	N	Cl	...	.....
18cba	Emily Johnson	179	..	Dr	1962	90	1962	D,S	Lig	C,G	.....	Wh.
18dda	Verna Westin	40	12	..	....	12	1962	D	Sd	...	.....
20d	J. Dohmstreich	100	18	B	1923	50	1934	N	Sd	...	.....
21ddc	George Molander	106	18	B	1915	20	1962	D	Gv	C,E	.....
22b	Orvin Finnesgard	380	3	Dr	1918	40	1934	N	Gv	...	.....
22ccd	Edwin Finnesgard	140	24-18	B	1915	138	1934	N	Cl	...	.....
23daa ₁	Bernard Benson	120	24	B	1914	3.0	8-15-62	N	Sd	...	.....
23daa ₂	..do...	140	4	Dr	1954	Flow	8-15-62	D	Sd	...	.....	Flows 3 gpm.
26ccd ₂	George Anderson	400	3-2	Dr	1926	30	1934	D,S	Sd	...	.....
26dd	..do...	240	4-3	Dr	1917	140	1934	N	Sd	...	.....
26ddc	..do...	140	4	Dr	....	110	1962	N	Lig & Sd	...	2,090	
27ccd	Mrs. Kirsta Paulson	20	12	B	1959	8	1962	D	..	C,H	.....	Lpc.
27cdc	..do...	34.5	18	B	1920's	20.5	8-15-62	N	Gv	N	.....
27dad	Karl Anderson	65	24	B	1928	7	1962	N	..	C,H	.....	Wh.
31ccc	USGS Test hole 3032	120	1.25	Dr	7-63	58.67	7-12-63	O	Gv	...	2,195	TD 280, T ₃ , L, C.
32cab ₁	C. A. Thedin	16.8	48	Du	1936	9.2	8-16-62	S	Sd	Cen,G	.....	Lpc.
32cab ₂	..do...	15	4	B	1957	7	1962	D	Sd	C,G	.....	Wh.
33cdc	Ernest Thvedt	264	4	Dr	1931	115	1962	S	Sd	...	2,205	
33ddd	USGS Test hole 3033	450	4.5	Dr	....	..	....	N	..	...	2,110	L.
34a	Arnold Anseth	125	24-18	B	1929	123	1934	N	Sd	...	.....
34acb	..do...	126.0	..	..	....	25.0	6-13-59	N	..	C,W	.....
34da	Gehard Anseth	250	5	Dr	....	31	1959	N	Sd	...	.....
34dad	..do...	47	6	Dr	1944	37	1962	D	Sd	C,E	2,060	Wh.
34ddd	NDWC Test hole 1525	283	4.5	Dr	1959	..	....	N	..	...	2,045	L.
35bba	Albert Anderson	180	3-2	Dr	1927	54.0	8-15-62	D	Sd	C,E	2,100	

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>161-100</u>												
5bdd	Cornwall Holm	12.0	36	Du	....	7.5	8-9-62	S	Gv	C,G	.....	Wh, Lpc.
5cce	..do...	21	30	Du	....	16	1962	D,S	..	E	.....	Lpc.
5dbb	George Lund	8	6	B	....	7	1962	D	..	..	.....
9ddd	Don Price	60	24	B	1958	29.8	8-9-62	S	Gv	C,W	.....
11adb	John Knudsvig	8.2	48	Du	....	4.8	8-9-62	S	Gv	B,H	.....	Wh.
13acc	Ed Thompson	29	24	B	....	10	1962	D	..	E	.....	Wh.
13daa	Emily Johnson	31	24	B	....	15	1962	N	..	C,W	.....	Wh.
14dac	Orlando Knudsvig	10.5	48	Du	1961	7.8	8-9-62	S	Sd	E	.....	Np.
15ceb	Edwin Lund	88	4	Dr	1961	16	1962	S	Lig?	C,W/G	.....	Ws.
17bd	Fred Eberle	26	6	Dr	1950	6	1962	S	Gv	..	.....	Wh.
18cca	Henry Aslakson	11.7	30	Du	1961	7.7	8-8-62	S	Gv	G	.....	Wh.
19abb	..do...	53	6	Dr	1959	39	1962	D,S	Gv	J,E	.....	Wh.
20acc	Carl Aaberg	18	30	Du	....	10	1962	D,S	..	C,E	.....	Wh.
22ccc	Don Price	104	4	Dr	1933	80	1962	D,S	Sd	C,E	.....	Wh.
22cdb	..do...	21.0	24	B	1961	4.7	8-9-62	N	Gv	..	.....
24baa	Paul Binde	209	4	Dr	1942	150	1962	D,S	Lig	E	.....	Wh (428).
27cc	Ordean Rude	115	5	Dr	....	100	1934	N	Gv	..	.....
27ccd	..do...	90	4	Dr	....	74	1962	D,S	..	Sub,E	2,230	Wh (376 ppm).
29add	Edwin Lund	26	24	B	1954	16	1962	D	Sd	C,E	.....	Lpc.
31add	Oscar Bendixson	16	12	B	....	12	1962	D,S	..	E	.....
31bca ₁	Steininger Estate	60	12	B	....	45	1962	D	Sd	C,H	.....	Ws, Lpc.
31bca ₂	..do...	128	12	B	....	5.6	8-8-62	S	..	C,H	.....	Wh, Lpc.
31ddd	Frank Moyzis	14	36	Du	....	10	1962	S	..	C,E	.....	Wh, Lpc.
33ddd	USGS Test hole 3031	140	4.5	Dr	1963	..	....	N	..	..	2,245	L.
<u>161-101</u>												
2cbc	USGS Test hole 3090	355	4.5	Dr	1963	..	....	N	..	..	2,159	L.
6cc	Anna Carlstad	500	3-2	Dr	....	460	1934	N	Sd	..	.....
8bcc	Carl A. Carlson	50	24	B	....	25.8	8-7-62	D	..	C,H	.....	Np, Lpc.
9acd	John Storhaug	12.7	54	Du	1961	7.3	8-7-62	S	Cl & Gv	C,E	.....	Wal, Lpc.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>161-101</u> Cont.												
9ccb	John Storhaug	18	48x60	Du	1959	13	1962	S	..	C,W/E	.....	Wh, Wal, Lpc.
10bda	Clarence & Hilma Seim	50	18	B	....	20	1962	D,S	Gv	C,H/W	.....	Wh.
10dd	Ordean & Anna Gunlikson	150	3	Dr	....	40	1934	N	Sd	...	.....
12cdb	Alfred Bardal	18	30	Du	1912	16	1962	D	..	C,E	.....
12cdc	..do...	160	4	Dr	1955	70	1962	S	Sd	C,E	.....
13cbd	Ordean Gunlikson	87	4	Dr	1949	30	1962	S	..	...	.....	Wh, C.
18d	Earl Carlson	110	24	B	....	80	1934	N	Sd	...	.....
22aba ₁	Arthur Riveland	21.1	30	Du	1956	13.75	8-7-62	D	Sd & Cl	C,E	.....	Wh, Lpc.
22aba ₂	..do...	120	4	Dr	1955	50	1962	S	..	C,E	.....	Wh (1368 ppm).
22baa ₂	Olin Riveland	10	36	Du	1945	6	1962	D	Gv	C,H	.....	Wh, Lpc.
22cba	Ludvig Ness	84	4	Dr	....	14	1962	S	Gv	...	.....	Wh.
23cdd	Olaf Myhr	43	18	B	....	25	1962	S	Gv	...	.....	Wh.
26adc ₁	Joe Grindeland	14.8	16	Du	1906	7.9	8-8-62	D	Gv	C,H	.....	Wh.
26adc ₂	..do...	55	18	B	1947	16.0	8-8-62	N	Cl	C,H	.....	Wh, Wal, Lpc.
33cad	John Storseth	75.0	5	Dr	....	41.5	8-8-62	N	..	...	.....
33cdd	USGS Test hole 3029	100	4.5	Dr	1963	..	....	N	..	...	2,158	L.
34ddb	H. T. Norvald	20	48	Du	....	10	1962	S	..	C,W	.....	Wal.
34ddc	..do...	47	18	B	1947	27	1947	D	Gv	E	.....	Wh, Lpc.
35add	USGS Test hole 3004	100	4.5	D	1963	..	....	N	..	...	2,182	L.
35dca ₁	William Stauffer	27	4.5	Dr	1961	16.8	8-8-62	D	Gv	Sub,E	.....	Wh.
35dca ₂	..do...	27	10	Du	1940	17	1962	D	Gv	J,E	.....
<u>161-102</u>												
2cba	L. O. Bloom	20	20	Du	1961	8.2	8-6-62	S	..	C,H	.....	Wh.
3daa	..do...	236	4	Dr	1962	20	1962	D,S	Sd	C,E	.....	C.
8dbd	M. V. Anderson	15	18	Du	1957	..	....	D	..	E	.....	Wh, Lpc.
94dd	USGS Test hole 2248	567	4.5	Dr	1964	..	....	N	..	...	2,171	L.
1bddd	Ida Erickson	84	5	Dr	1949	69	1962	S	Lig	C,W	.....
17aab	Web Bublitz	200	4	Dr	....	100	1963	S	..	C,E	.....	Np, C.
19cbb	USGS Test hole 3006	370	4.5	Dr	....	..	....	N	..	...	2,055	L.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>161-102</u> Cont.												
20bac	Harold Madsen	235	4	Dr	1954	120	1962	S	Sd	C,E/G	.....
22bba	Mrs. Palma Skabo	15	48	Du	1945	3	1962	S	..	C,E	.....	Wal, Lpc.
23bba	Fred Heide	22	36	Du	1945	12	1962	D,S	Sd	C,E	.....
24cba	Olaf Nelson	17	10	Du	1937	15	1962	D	Lig	C,H	.....	Wh, Lpc.
24cbb ₁	..do...	80	2	Dr	1958	50	1962	D	Lig	J,E	.....	Wh.
24cbb ₂	..do...	80	4	Dr	1920	50	1962	S	..	C,E	.....	Wh, Np.
25 bba	Ragnar Slaaen	152	4	Dr	1936	..	....	S	..	C,E	.....	Wh, Np.
25ddc	..do...	151	4	Dr	1961	..	....	S	Sd	C,G	.....	Wh, Np, C.
26bcc	Torger Slaaen	68	4	Dr	1950	..	....	D	Gv	C,H	.....
27aaa	USGS Test hole 3080	535	4.5	Dr	10-63	..	....	N	..	..	2,130	L.
27bbc	Edwin Graupe	13.2	48	Du	1961	6.3	8-4-62	D,S	..	C,G	.....	Lpc.
27cbb	Douglas Graupe	96.0	18	B	1927	55.50	8-4-62	S	..	C,W	.....	Lpc, T ₃ ,C.
32dbb	Alvin Quam	7.80	18	B	....	6.94	6-12-56	N	..	C,H	.....
33bda	Owen D. Graupe	36.7	18	B	....	17.1	6-12-59	N	..	C,W	.....
35dac	Torger Slaaen	240	4	Dr	....	30	1962	S	Gv	C,E	.....	Wh (1740 ppm).
<u>161-103</u>												
2cba	Lloyd Kittelson	32	18	Dr	1960	7.64	4-29-64	Irr.	Gv	Tu,G	.....	L, Yield 220 gpm.
11ada	Burrett Raam	200	4	Dr	1950	70	1962	D,S	Gv	C,E	.....	L.
12ada	H. B. & M. Madsen	125	4	Dr	1940	70	1962	D	Sd	E	.....	Wh.
12b	H. A. & Clara Rasmussen	183	6	Dr	1920	123	1934	N	..	..	.....	Wh.
12cdc	Conlin Bowman	135	4	Dr	1950	40	1962	D,S	Sd	E	.....	Wh.
12dd	Alfred Elm	153	6	Dr	....	20	1934	N	Sd	..	.....
13ccc	Harold Madsen	30	4	Dr	1953	8	1962	N	Sd	C,H	.....
13cdc ₁	..do...	70	4	Dr	1949	60	1962	D	Sd	J,E	.....	Wh (1160), Np.
13cdc	..do...	70	4	Dr	1949	60	1962	S	Sd	C,E	.....	L.
14aab ²	Maria Nelson	160	5	Dr	1947	..	....	D	..	E	.....	Wal.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>161-103 Cont.</u>												
15bad	Rufus Wittmayer	25	6	B	1952	22	1962	D,S	Gv	E	.....	Wh.
23acd	Roy Anderson	54	4	Dr	...	40	1962	D,S	..	C,E	.....	Wal.
25aad	G. C. Anderson	169	3	Dr	....	30	1962	D,S	..	C	.....
26add1	R. J. Johnson	35	24	B	1958	27	1962	D	Gv	E	.....	Wh, Wal.
26add2	..do...	35	24	B	1944	27	1962	S	Gv	C,E	.....	Wh.
35bd	Simon Taarud	61.4	24	..	....	49.9	6-12-59	N	..	C,W	.....
35d	Harold Haugen	94	6	B	....	62	1934	N	Sd & Gv	...	.....
<u>162-95</u>												
1bbb	E. H. Brandt	25	18	B	....	7.98	7-24-63	D,O	..	P,H	1,936	T ₃ -
2bbc	Vernon Brandt	130	4	Dr	....	6	1959	N	..		1,955	L.
3cbb	Kalmer Haarstad	38	12	B	....	28	1962	D	..	E	....
3daa ₁	Baukol-Noonan Inc.	60	6	Dr	....	30	1963	D	..	...	1,975	Yield 7 gpm, L.
3daa ₂	..do...	134	4	Dr	....	50	1963	Ind Cl & Sd	..	...	1,975	L.
3daa ₃	..do...	60	4	Dr	1930	..	....	Ind	..	...	1,975	
4acd ³	..do...	390	6	Dr	1950	119	1961	Ps	..	Sub,E	1,980	Ws, yield 25 gpm, L, C.
4add ₂	City of Noonan	60	36	B	....	30	1961	Ps	..	C,H	.....	C.
4add ₃	..do...	365	6-3	Dr	....	100	1962	Ps	..	T ₆ E	.....	Ws, Yield 50 gpm, C
4bdd	Roy Fenster	27	24	B	....	20	1962	S	..	...	.....
4daa	Noonan High School	46	4	Dr	1957	38	1957	Ps	..	...	.....	Plot 2.5 ppm.
5abb ₁	Jules Vandewalle	75	4	Dr	....	40	1963	D	..	J,E	.....	Wh.
5abb ₂	..do...	350	4	Dr	....	50	1963	S	..	C,E	.....	Ws, C.
5cbb	H. O. Smithberg	35	18	B	....	22.83	8-13-63	D,S	..	C,W	1,952	
6cbb	Louie Miller	10	30	Du	....	2.10	8-13-63	D,S	..	C,E	1,933	
7aba	Mrs. Jenny Sorenson	238	4	Dr	1916	15	1947	D,S	..	C,H	1,971	C.
7cbc	Charles Henry	20	48	Du	1912	11.09	5-9-47	N	..	...	2,050	
8cbb	D. E. Smithberg	180	4	Dr	1961	45	1963	D	..	C,E	2,005	Ws, C.
9ddd	A. F. Kimball	100	12	Dr	1923	88	1963	D	..	...	1,952	Np.
10ddc	Pearl Taylor	60	36	Du	....	38.27	8-14-63	N	..	...	2,063	

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>162-95</u> Cont.												
13caa	Leonard & Willard Nordman	50	18	B	....	32.64	5-12-47	N	..	...	2,090	
14ccc	F. Hewer	122	4	Dr	1913	82	1934	N	Lig	N	.....	C.
15abb1	..do...	21	14	Dr	....	15	1962	D,S	Lig	C,W	.....
15abb2	..do...	80	14	B	....	15.11	5-12-47	N	..	C,H	.....
15bbb	F. P. Kimball	45	24	B	1910	29.99	8-14-63	D,S	Gv	J,E	2,050	Wh, T3.
17cbc	A. Devriendt	80	6	..	....	40	1963	S	Sd	C,E	.....
18bdd	Morris D'Huyvetter	80	5	Dr	1959	50	1962	D,S	Sd	C,E	.....	C.
20ca	Calvert Oil Co.	7,032	..	..	1957	..	....	...	..	...	.....	C.
21aab	Albert D'Huyvetter	115	4	Dr	1959	55	1962	D,S	..	J,E	2,093	Wh (175 ppm).
21baa	Mrs. Agusta Lagein	70	24	B	1921	60	1962	D,S	..	C,W	.....
23ccc	Arnold W. Nordman	134	2	Dr	1914	100	1962	D,S	Lig	C,E	2,205	
24bdd	Clarence Spooner	100	24-18	B	1928	70	1934	N	Lig	C,H	.....
25bcb	Howard J. Nielson	158	3	Dr	1911	140	1962	D,S	Lig	C,E	2,233	
26bbb	Gordon Wallin	142	3	Dr	1908	100	1962	D,S	Lig	C,E	2,211	
27cca	Arthur M. Paulson	218	5-4	Dr	1928	160	1963	D,S	Sd	C,E	.....
27cdb	..do...	14	18	B	....	10	1963	S	..	C,H	.....	Lpc.
29bbb	Halgrim Braathen	137	3	Dr	1955	100	1962	S	..	C,E	2,235	Wh.
29cdd	Gerald Tanberg	210	3.5	Dr	1923	175	1962	D,S	..	C,W	.....
30cdd	Ole Braathen	280	4	Dr	1948	130	1963	D,S	Gv	C,E	2,235	Wh.
31ada	Joseph Gustafson	217	4	Dr	1929	197	1963	D,S	Gv	C,W	2,340	Wh, C.
31cdc	E. Shirley	285	4	Dr	....	92	1963	S	..	C,E	2,360	L, Yield 2.5 gpm.
32ddd	Vernon Tanberg	140	6	Dr	....	100	1962	S	..	C	2,360	
34ddd	Orville A. Johnson	283	2	Dr	1912	200	1962	S	..	C,E	2,328	
35bdc	Walter Nordman	..	12	B	....	12.17	8-14-63	D,S	..	C,H	.....
35cdc	Lewis Spooner	250	2	Dr	1912	208	1962	S	..	C,E	2,332	
36a	Wilmer Klebe	170	6	..	....	80	1962	S	..	...	.....
36cdd	Hans Brodal	18	6	B	....	13	1963	N	..	C,H	.....	Wh.
<u>162-96</u>												
1cdd	Wm. Joyce	26	5	B	....	20	1962	D,S	..	C,W	.....
1ddd	Harold & Doris Smithberg	60	18	B	1933	35.96	8-13-46	D,S	..	C,E	1,972	
2cdd	John Krecklau	52	18	B	....	47	1962	D,S	..	C,W	1,981	Wh, Lpc.
3cbb	M. B. Benson	..	4	Dr	1909	92.79	8-13-46	N	..	C,N	2,001	

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
162-96 Cont.												
5aaa	Alfred Joyce	..	12	B	....	9.01	7-24-63	N	..	C,W	.....
5dcd1	Theo. Romsos	320	5	Dr	....	20	1934	N	Sd	N	1,954	C.
5dcd2	..do...	38	12	B	....	33.93	8-13-46	N	..	C,H	1,954	
6bcc	H. E. Jacobson	126	4	Dr	1961	Flow	1963	S	Sd	..	1,940	Flows 2 gpm, C.
7cbb1	Kenneth Granrud	40	18	B	....	23.13	6-25-63	N	..	C,H	.....
7cbb2	..do...	25	36	B	....	15	1962	N	..	..	.....
7dab	Othard Stenerson	42	18	B	1914	40	1963	S	..	C,H	1,971	
7ddd1	Peter Haugland	70	12	B	....	43.07	8-12-46	N	..	..	.....	Wh, Wal.
7ddd2	..do...	76	4	Dr	....	34	1962	D,S	..	C,E	1,992	Tested 9 gpm.
10ddd	L. F. Rindel	50	24	B	....	27.12	5-9-47	N	Sd	..	2,068	
11aaa	USGS Test hole	100	4.5	Dr	1947	5.61	6-30-47	N	..	..	1,953	L, MB.
11cdc	USGS Test hole 3021	140	4.5	D	1963	..	..	N	..	..	2,090	L.
12ddd	Verlinda Bros.	65	48-4	B,Dr	....	60	1963	D,S	Sd	C,W	.....	Wh.
13caa	Henry Focke	300	4	Dr	....	170	1963	N	..	C,W	.....
15aaa	E. Krecklow	390	5	Dr	1933	190	1962	N	Sd	C,W	2,108	
15bbb1	Vincent Rindell	200	6	..	....	180	1962	S	..	C,E	2,080	C.
15bbb2	..do...	26	18	..	....	24	1962	D	..	C,H	.....
16bbb	Leo F. Rindell	189	4	Dr	....	140	1962	S	..	..	.....	Wh.
17ccb	Mearle L. Smithberg	125	6	Dr	....	110	1963	S	..	C,E	2,040	
18bbb1	Andrew Lunde	118	6	Dr	....	36	1962	S	..	..	.....	Wh.
18bbb2	..do...	18	60	Du	....	11	1963	D,S	..	C,H	.....	Wh.
19ab	Olaf Anderson	19	30	B	....	5	1962	D,S	..	..	.....	Wh.
19dbb	Hubert Bummer	68	6	..	....	40	1962	D,S	..	C,E	.....
20dcb	David Fosland	150	6-4	Dr	1913	115	1963	D,S	Gv	C,E	2,118	Wh.
21bab	P. Fry	150	6	Dr	....	107	1938	D,S	Sd	C,G	2,105	
21cba	Arnold Anseth	254	6	Dr	....	130	1963	D,S	..	C,E	2,152	Wh.
22cda	Dan Rice	430	3	Dr	....	200	1963	D,S	..	C,W	2,208	Ws, Hp.
25cdc	Holte-Weber	280	5	Dr	....	122.4	8-13-63	D	..	C,W	2,300	Ws.
27bdb	Sven Bakken	68	18	B	....	54	1962	D,S	..	C,E	2,212	Wh, C.
28ab	John Baker	205	6	Du	....	115	1963	D,S	Gv	C,W	2,200	Wh.
30bbc	Bummer Est.	100	5	..	....	60	1962	N	..	C	.....	Wh.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>162-96</u> Cont.												
31aaa ₁	John Nygaard	15	14	B	....	2	1963	D	..	C,H	.....
31aaa ₂	..do...	40	14	B	1953	36	1963	S	..	C,E	.....	Lpc.
31aaa ₃	..do...	300	6	Dr	....	250	1963	N	..	C,W	.....	Np.
32bbb	USGS Test hole 3022	320	4.5	Dr	1963	..	....	N	..	..	2,186	L.
33bab	Allen Moun	291	4	Dr	1962	200	1962	D,S	Li _g	C,E	2,235	Ws, C.
34cbc	Jacob J. Fagerland	16	24	Du	....	3.78	7-25-63	D,S	..	C,W/H	.....
34ccb	..do...	54	18	B	....	50	1963	S	..	C,E	2,260	Wal.
35aab	Erling Larson	280	5	Dr	1916	276	1963	D,S	Sd	C,E	2,300	Wh.
<u>162-97</u>												
1cbb	C. N. Bummer	18	18	B	....	15	1962	D	..	C,H	.....	Wh, Lpc.
4bcc	Edwin Peterson	40	18	B	....	20	1945	N	Gv	C,N	.....
5aac	..do...	50	18	B	....	25	1963	D,S	..	C,W	.....	Wh, Wal.
6dab	Adolf Carlson	27	18	B	..	13.20	6-25-63	D,S	..	C,E	1,950	T ₃ , C.
8bcc	Harlan Nordstog	50	4	B	....	35	1963	D,S	Sd & Gv	C,W	1,984	Wh.
8ccc	A. T. Dolan	55	48	Du	1912	23	1963	N	..	C,N	1,989	Wh.
9aaa	Alvin Svangstu	110	3	B	1935	23	1962	D,S	..	J,E	1,977	Wh (615 ppm), C.
10bbb	Olaf Lodahl	322	4	Dr	1932	12	1962	D,S	Gv	N	1,978	C.
12add	Edwin Skar	30	18	B	....	24.20	9-8-45	D	..	C,H	1,960	
14aad	Vernon Bilstad	265	5	Dr	1910	16	1963	S	..	C	.....	Wh, C.
14baa	Gordon Peterson	11	48	Du	....	6	1962	S,D	Sd	C,H	1,951	Wh.
14ccd ₁	Olaf Wenstad	96	15	B	....	37	1963	D,S	..	Sub,E	2,000	Ws, C.
14cdd ₂	..do...	40	6	B	....	14	1963	D,S	..	J,E	2,002	Wh, C.
14ddd	NDWC Test hole 1532	378	4.5	Dr	1959	..	....	N	..	..	1,992	L.
15cbb	Edwin Tiegen	12	48	Du	....	3	1963	D,S	..	C,E	.....	Wh.
16dd	Schoel	..	18	B	20.40	6-25-63	N	..	..	C,H	1,980	
17ccc	Oscar Storsli	30	18	B	....	24	1962	D,S	..	C,W	.....	Wh, Lpc.
18aad	Oscar Nordstog	57	12	B	....	45	1962	S	..	C,G	1,990	Wh.
19ccc ₁	Marlin Wenstad	65	18	B	....	55	1962	D	..	E	2,028	Wh, Lpc.
19ccc ₂	..do...	305	4	Dr	....	182.2	6-26-63	S	..	C,W	2,028	C.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>162-97</u> Cont.												
19ccc3	NDWC Test hole 1530	394	5	Dr	1959	..	....	N	..	...	2,033	L.
19dde	Alvin Westlie	86	6	Dr	....	45	1962	D,S	..	C,W	2,005	Wh, Wal.
20aaa	Ole Bakken	70	18	B	....	20	1963	N	..	C,W	1,980	Wh, Lpc.
20baa	Alfred Joyce	78	28	B	....	26.22	6-5-63	D	..	C,W	1,970	Wh, Lpc.
21aaa	Stanford Throntweit	35	18	Du	....	20	1963	D	..	C,E	....
21bbc	Ole Bakken	50	18	B	....	15.43	6-25-63	D	..	C,N	1,975	T3
22bbc	Raymond Schwanz	45	24	B	....	30	1962	D,S	..	C,W	1,976	Wh, Lpc.
25bcc1	Alfred Joyce	90	18	B	....	48	1962	S	..	C,W	....
25bcc2	..do...	12	30	Du	....	6	1963	D,S	..	...	2,050	Ws.
28bbb	Fred Hass	70	18	B	....	46	1962	D,S	Sd	C,W	1,994	Wh.
28cdb	E. H. & F. H. Gherke	15	48	Du	....	6	1962	D,S	..	C,H	1,980	Wh.
29abb	J. Alden Nordstog	101	4	Dr	1957	32.60	6-25-63	D,S	..	C,W	2,002	Wh, tested 13 gpm, L.
30ccc	O. P. Weimoth	72	14	B	....	15	1962	D,S	..	C,H	....
31dda	Alex Murphy	140	4	Dr	1923	40	1962	D,S	Sd	C,W	2,069	Wh, Lpc, C.
32bbb	NDWC Test hole 1529	305	4.5	Dr	1959	..	....	..	..	...	2,030	L.
32dbd	T. E. Ebreck	92	4	Dr	1957	20	1962	D	..	Sub,E	2,022	Wh, L.
34aaa	Arnold Jacobson	30	24	B	1961	20	1962	D,S	Sd	J,E	....	Ws.
36aaa	Wilmer & Marvin Klebe	184	5	Dr	....	100	1947	N	..	C,W	....	C.
<u>162-98</u>												
1bbb	R. B. Poling	300	3	Dr	....	Flow	1962	N	..	...	2,050	Ws, Np, T. 48°F., C.
1da	Herman Larson	270	3	Dr	....	Flow	1963	N	..	...	2,018	C.
2cdc	Mrs. Mons Kvale	52	18	B	....	20	1962	D	Sd	C,E	2,085	
3edc1	Arthur Holm	30	24	B	1914	15.05	8-7-46	N	..	N	2,114	Wh.
3edc2	..do...	40	18	B	1962	12.88	6-26-63	D,S	..	C,E	2,114	Wh.
4ebb	Knute Unhjem	109	6	Dr	....	100	1963	N	..	C,W	2,202	Np.
5add	..do...	107	6	Dr	....	100	1963	D,S	Sd	C,W	2,196	Wh, Lpc, C.
6ebc	Julius Lystad Est.	175	4	Dr	....	140	1962	D,S	..	C,E	2,252	Wh.
8daa	Walter Sparks	24	60	Du	....	6	1962	D,S	..	C,E	2,070	Wh.
10bab	Anders Anderson	170	4	Dr	....	20	1962	D,S	..	C	2,117	Wh.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
162-98 Cont.												
11bba ₁	Delton Schwanz	50	6	Dr	....	25	1962	D	Sd	E	.....	Wh.
11bba ₂	..do...	35	18	B	....	20	1962	N	Gv	...	.....
12cda	..do...	160	3-2	Dr	....	Flow	1963	S	Sd	N	.....	Ws, C.
12ddd	USGS Test hole	324	4.5	Dr	1947	Flow	1947	N	..	...	2,027	L, C, MB.
13cd	Gust Westby	350	32	Dr	1918	Flow	1963	S	..	N	.....	C.
14daa	Erling Doland	170	4	Dr	1962	Flow	1963	D,S	Sd	N	.....	Flows 1.25 gpm, TD 188, L, C.
17ddd	Olaf Anderson	60	12	B	....	8.44	8-23-46	N	Gv	...	.....
19abb	..do...	19	24	B	1962	15.50	7-2-63	D,S	..	P,E	.....
19abc	..do...	15	72	Du	....	4	1962	S	..	...	.....	Ws.
20ccc	Orville Overland	27	24	..	....	10	1962	D,S	..	...	.....	Ws.
21ccb	Richard Haugenoe	7	36	Du	....	1.2	8-14-63	D,S	Sd	C,H	.....	Wh.
23aaa	NDWC Test hole 1531	304	4.5	Dr	1959	..	....	..	..	..	.....	L.
23ccc	USGS Test hole	195	4.5	Dr	1947	14.34	6-26-47	N	..	...	2,078	L, MB.
23daa ₁	Bertil Olson	177.5	3	Dr	....	+0.6	6-26-63	N	..	N	2,060	
23daa ₂	..do...	138	14	Br	....	19.28	6-26-63	N	..	C,H	2,060	
23daa ₃	..do...	400	..	Dr	....	+0.6	6-26-63	N	..	...	2,060	C.
24aac	C. F. Prahl	400	3	Dr	....	Flow	1946	N	..	N	.....	C.
25aab	Lawrence Welo	350	5	Dr	....	25	1962	D,S	..	C,W	2,041	Wh.
25bab	Peter Moe	80	18	B	....	63.92	6-26-63	D,S	..	C,E	.....	Wal.
25cdc	Harry J. Johnson	86	12	..	....	25	1963	D,S	..	C,G	2,653	Wh.
25ddd	USGS Test hole 3089	475	4.5	..	1963	..	....	N	..	...	2,033	L.
26abb	Ingvar Moe	362	2	Dr	....	Flow	1963	D,S	..	C	2,050	Wh (380 ppm), Np, C.
27aaa	Arthur Haiberg	180	12	B	....	7.72	7-2-63	D	..	C,E	2,081	Wh.
28aaa	Mrs. Agnes Poirier	70	12	B	....	26.51	8-27-46	D	..	C,E	2,121	
28bab	Bertil Olson	60	12	B	....	15.58	7-2-63	D,S	Gv	C,E	2,111	Wh, C.
29bba	Erwin M. Hanson	12	72x144	Du	1959	6.98	7-2-63	D	..	J,E	.....
31aad	Glen Olson	365	3to2	Dr	....	310	1962	D,S	..	C,W	.....	Ws, C.
31bdd	Clifford Olson	67	12	B	....	60	1962	D,S	Sd	C,W	2,162	Wh (171 ppm).

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
162-98 Cont.												
32bbc	Orville Overland	385	2	D	....	350	1962	S	..	C,W	2,141	Ws, C.
33obb	Sim & Emelia Swenson	297	3	D	....	22.66	7-2-63	O	..	N	2,111	T3.
35ccc	Nathan Lindsay	15	36x72	Du	....	12	1963	S	..	C,E	.....
35ddd	Nardine Johnson	100	4	D	....	35	1962	D,S	Sd	C,E	2,055	Wh,C.
162-99												
1bb	A. Almos	62	24	B	1934	12.2	5-2-47	S	Gv	C,W	2,261	
2aab	Leonard Sorenson	330	4	Dr	....	8	1934	N	..	C,W	2,290	Wal.
2ddd	Olaf Faldalen	87	6-24	Dr,B	1914	58	1962	S	Sd	C,W	2,284	Wh, Wal, Np, Lpc.
3dcc	Sam Larson	33.2	24	B	1961	10.10	9-6-62	S	Gv	C,G	.....	Wh, Lpc.
4cc	Arthur Selee	561	3-2	Dr	1918	125	1934	N	Sd	...	.....	Np.
4cdc	..do...	40	24	..	....	28	1962	D	..	...	.....	Wh.
5bbd	Andrew Carlson	447	4	Dr	1918	160	1962	N	Sd	C,H	.....	Wh.
5cca	Charles Hanson	42	18	B	1915	24	1962	D,S	Gv	C,E	.....	Wh, Lpc.
6ddb	Strand Bros.	380	4	Dr	1946	120	1962	S	Gv	C,E	.....	Wh, C.
7ddd	Sortland Estate	600	3	Dr	1917	150	1962	S	Ss	C,W	.....	Ws.
8ddd	Martin Leland	19.6	48	Du	1913	10.7	9-5-62	N	..	C,N	.....	Wh, Lpc.
9bbb	Conrade Selle	22	24	..	....	12	1962	D,S	..	...	.....	Wh.
9cdc	O. M. & E. C. Haugenoe	34.3	18	B	....	11.6	9-5-62	N	..	C,N	.....
10ccc ₁	Ronello Davis	20	24	..	....	18	1962	D	..	...	.....	Ws.
10ccc ₂	..do...	72	24	..	....	25	1962	S	..	...	.....	Wh.
11aab	Oliver Lystad	30	24	B	....	10	1962	D	Sd	Sub,E	.....	Wh, Lpc.
11aba ₁	..do...	250	6	Dr	....	90	1962	S	Sd	C,E	2,290	Wh, Lpc.
11aba ₂	..do...	61.5	24	B	....	17.1	9-6-62	S	Sd	Sub,E	.....	Wh, Lpc.
11bb	Sam Larson	58	24	B	....	40	1962	S	Sd	C,E	.....	Wal, Np, Lpc.
13aac	Eilevf Anderson	39	24	B	1939	13.3	9-6-62	D	..	C,H	.....	Wh, Lpc.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>162-99</u>												
14daa	Conrad Mortenson	90	18	B	....	16.52	5-7-47	N	..	....	2,281	
17ada	Leonard J. Larson	600	4-2	Dr	1917	200	1962	S	Sd	C,E	.....	Wh, Np.
18dba ₁	Godfred Gilbertson	671	4-1.25	Dr	1917	250	1962	S	Gv	C,E	.....
18dba ₂	..do...	25.4	18	B	1938	8.7	9-5-62	D	..	C,H	.....	Wh, Lpc.
21aad	Oscar Haugenoe	15	24	..	....	8.0	1962	D,S	Sd	P,E	.....	Wh, Wal, Lpc.
21baa	E. Berg	37.1	18	B	1945	17.0	9-5-62	S	..	C,E	.....	Wh, Wal, Np.
21caa	..do...	64.0	18	B	....	18.4	9-5-62	N	..	N	.....
27bca	Mabel Ouse	46.1	16	B	....	12.7	9-6-62	S	..	C,E	.....	Wal, Np.
27dab	Harry Thompson	20	24	B	1957	14	1962	N	..	C,H	.....	Wh, Lpc.
32ddc	Kenneth Long	113	4-3	Dr	1942	83	1962	S	Sd	C,E	.....	Wh, Wal.
34cbc	Anna Shotswell	36	16	B	1941	34	1962	D	Gv	C,H	.....	Wh, Lpc.
34dab	Carl Ellingson	508	3-2	Dr	1933	40	1962	D,S	..	C,G	.....	Ws, C.
35aac	Olga Bjornvedt	16.3	12	B	....	9.5	9-6-62	N	..	C,H	.....
35bcb	E. L. Ellingson	82	18	B	1914	7.98	5-8-48	N	..	..	.....
35dba	B. N. Ledahl	49.0	12	B	....	14.5	9-6-62	N	..	C,H	.....
<u>162-100</u>												
1bbb	C. H. Dahl	133	4	Dr	....	45	1962	S	..	C,E	.....
2bcd	Peter J. Dahl	28.1	18	B	....	4.1	9-3-62	N	..	N	.....
3daa ₁	..do...	30	24	B	1959	18	1962	D,S	Gv	E	.....	Wh.
3daa ₂	..do...	20	24	B	1946	12	1962	S	Sd	E	.....	Wh (239 ppm).
7baa	Eddie Johnson	12	60	Dr	....	8	1962	S	..	C,G	.....	Wh, Np.
7dab	..do...	51.0	18	B	....	0.0	9-1-62	N	..	C,H	.....
8bbb ₁	..do...	26.1	24	B	1959	22.7	9-1-62	D	Gv	E	.....	Pumps 1.5 ppm.
8bbb ₂	..do...	18	48	Du	1936	10	1962	S	..	C,E	.....	Wal, Lpc.
9bdd	A. L. Watkins	24	24	..	....	6	1962	D,S	..	..	.....
11daa ₁	Dahl Bros.	451	3-2	Dr	1924	16.5	9-4-62	N	..	N	.....	Ws.

Or

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>162-100</u> Cont.												
11daa ₂	Dahl Bros.	452	4	Dr	1956	175	1962	S	Sd	C,E	.....	Ws, Td 525, L.
14cac	Paul & Ingvar Moe	18.4	48	Du	1936	8.3	9-4-62	S	Gv	C,W	.....
15cdd	David Olson	28	..	..	....	8	1962	D	Sd	..	.....
17dd	Oscar Olsen	300	3	Dr	....	70	1962	N	Gv	N	.....
19aba	Martin L. Olsen	12	42	..	....	9	1962	D,S	Gv	E	.....
20aa	Wilmer Selle	20	36	..	....	17	1962	S	..	..	.....
20dbc	Ray Riveland	14	36	..	....	11	1962	D,S	..	.....	.....	Lpc.
21bbc	Wilmer Selle	20	36	..	1959	7	1962	D,S	..	E	.....	Lpc.
22baa	David Olsen	23	22	..	....	10	1962	S	Gv	C,G	.....	Wh, Lpc.
22dcc	Logen Thompson	13.8	36	..	....	10.3	9-4-62	D,S	..	C,E	.....	Wh, Lpc.
23aaa ₁	Paul & Ingvar Moe	500	4-3	..	....	185	1962	S	Sd	C,E	.....	Wh (1700 ppm) C.
23aaa ₂	..do...	232	3	..	....	173	1962	N	..	..	.....	Wh.
23cdd	Kermit Hanson	48.5	..	..	....	14.0	9-4-63	N	..	N	.....
24aa	Arthur M. Olsen	400	6	..	....	200	1962	S	..	..	.....
26bda	J. P. Sand	17.4	24	..	....	6.0	9-5-61	D,S	Gv	C,E	.....	Wh.
27baa	Sidney Hauge	24	24	..	....	20	1962	D,S	Gv	C,E	.....	Wh, Lpc.
32bbd	M. F. Haltel	16.0	36	..	....	11.5	9-1-62	D,S	Gv	C,E	.....	Ws.
34ddc ₁	Gernart Sellie	31.5	18	..	....	18.3	9-4-62	S	Sd	C,E	.....	Wh, Lpc.
34ddc ₂	..do...	11.9	36	Du	....	6.8	9-4-62	D	Gv	C,H	.....
35aaa	USGS Test hole 3015	240	4.5	Dr	1963	..	....	N	..	..	2,313	L.
<u>162-101</u>												
2bba	Leonard Biberdorf	196	3	Dr	1938	100	1962	D,S	Sd	C,E	.....	Wh (650 ppm).
2dcc	Edward Olsen	39.8	18	B	....	8.2	8-30-62	Sp	..	C,E	.....	Wh.
3daa	Ernest Dixon	64.4	18	B	1950	26	1962	N	Sd	N	.....
3dba	..do...	14.7	48	Du	1961	10.4	8-30-62	D,S	Gv	Gen,E	.....	Ws, C.
4cdc	Henry Hagen	14	48	Du	....	11	1962	D	..	..	.....
7bbb	Kenneth Heckman	49.3	6	Dr	....	Flow	1962	N	Gv	..	.....	T 47°F.
7ccc	..do...	30	18	B	1953	18	1962	D,S	Sd	E	.....	Wh, Lpc.
7ccd	..do...	24	24	B	....	16	1962	N	..	C,E	.....	Wh.
8aa	Gordon Raaum	25	48	Du	....	18	1962	S	..	..	.....	Wh.
9baa	Ora Oddegard	15	36	Du	....	13	1962	D	..	..	.....

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>162-101</u> Cont.												
10ccd	Ora Odegard	14.8	..	Du	....	9.6	8-30-62	N	..	N	.....
16ccc	USGS Test hole 3078	335	4.5	Dr	1962	..	....	N	..	..	2,030	L.
17bda	Joe Raaum	22.8	36	Du	....	7.6	8-30-62	D	Gv	N	.....	Wh.
18adb	Andrew Stene	22.1	48	Du	....	16.4	8-30-62	N	..	C,H	.....
20daa	Clara Haugenoe	16	24	B	1960	8	1962	D,S	Gv	C,H	.....	Wh, Lpc.
21abb	Elmer Reistad	8.9	18	B	....	6.5	8-31-62	S	..	..	.....	Np.
23ccc	Arne Reistad	44	4	Dr	1955	20	1962	D,S	..	C,E	.....	C.
27ddd	Orville Raaum	14	36	Du	....	9.34	10-17-63	D,S	..	P,H	.....
28ccb1	Ole Raaum	35	2	B	1959	9.6	8-31-62	D	Gv	C,H	.....	Wh.
28ccb2	..do...	22	18	B	1958	9.6	8-31-62	D	..	C,G	.....
29aad1	Allen Stromstad	18	24	B	1952	6	1962	D	..	..	.....
29aad2	..do...	12	24	B	1957	8	1962	S	..	C	.....
30acb	Donald Reistad	36	24	..	....	25	1962	N	Gv	..	.....	Wh, Np.
31aaa	USGS Test hole 3079	115	1.25	Dr	1963	33.88	11-13-63	O	..	..	2,158	Td 445 ft, L, T3, C.
31dbb	Kenneth Reisted	30	18	Du	1960	8.0	8-31-62	S	Gv	C,G	.....	Wh, Lpc.
33bcc	Clara Raaum	23	24	B	....	11.9	8-31-62	S	..	C,E	.....	Np.
33bcd	..do...	24.8	18	B	1959	10.8	8-31-62	D,S	Gv	E	.....	Wh.
34cab	Orville Johnson	19	24	B	1958	15	1962	S	Cl	..	.....	Lpc.
35cdd	Adolph Sather	440	6	Dr	1923	140	1962	S	Sd	C,E	.....	Ws.
<u>162-102</u>												
3adc	Olef Reistad	234	4	Dr	....	140	1962	D,S	Sd	..	.....	Ws.
3dd	Orton Thon	180	4	Dr	....	120	1962	S	..	..	.....	Wh.
4dbc	George Herman	30	12	B	....	28	1962	D,S	..	..	.....	Wh.
4dbd	..do...	30	6	B	....	25	1962	S	..	..	.....	Wh.
5bba	T. P. Thon	60	24	B	1933	..	....	D,S	..	C,E	.....	Wh, Lpc.
5dda	S. O. Thorpe	50.0	4	Dr	....	28.0	8-28-62	N	..	N	.....
7ccc	USGS Test hole 2247	115	1.25	Dr	1964	54.51	6-24-64	O	..	..	2,116	Td 189, L, T3, C.
10bbb	Nickolai Rodne	56	24	B	1915	54	1962	D	Gv	C,H	.....	Wh.
11dde	School Dist. #1	118	4	Dr	1956	..	....	Ps	..	E	.....
13beb	Mrs. Esther Stromstad	300	3	Dr	....	140	1962	S	..	C,E	.....	Wh.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>162-102</u> Cont.												
14aac	Village of Alkabo	16	24	B	....	..	....	Ps	Gv	C,H	.....	Wh, C.
14cdd	John Tennesen	35	24	B	....	25	1962	S	..	C,E	.....	Wal, Np.
20aba	Sodium Corp. of America	29	4	Dr	1957	Flow	1963	..	Gv	E	.....	L,C.
22aaa ₁	Ralph DeJardine	40	4	Dr	1954	20	1962	D	..	E	.....	Ws.
22aaa ₂	..do...	17.5	24	Du	1939	10.7	8-29-62	S	..	C,E	.....	.....
23aaa	USGS Test hole 3011	385	4.5	Dr	1962	..	....	N	..	..	2,076	L.
23ccc	Arne Reistad	44	4	Dr	1956	24	1956	D,S	..	C,E	.....	Wh.
24baa ₁	Lester Raaum	16	30	B	1954	5	1962	S	Gv	C,E	.....	Wh.
24baa ₂	..do...	188	4	Dr	1953	148	1962	D	Gv	C,E	.....	Ws, Lpc.
28daa	Trygve Norby	18	36	Du	....	9.8	8-28-62	N	..	C,H	.....	Ws, Lpc.
28dad	..do...	293	3	Dr	1959	80	1962	D,S	..	C,E	.....	Wh.
30ccc	Mrs. Anna Felland	105	4	Dr	1956	15	1962	Ds	Sd	C,E	.....	Wh (960 ppm).
35bbb	Henry Olson	14	36	Du	1959	6.9	8-29-62	D,S	Gv	E	.....	Wh.
36abc	Hilma Hansen	15.5	36	Du	....	6.8	8-29-62	D	..	C,H	.....	Ws.
36bbc	..do...	65.5	24	B	....	58.3	6-12-58	N	..	C,H	.....	.....
<u>162-103</u>												
10cbb	Farmers Grain & Trading Co.	60	..	Dr	....	50	1963	D	Gv	J,E	.....	C.
10cab	John Jensen	62	4	Dr	1945	51	1962	D,S	Gv	J,E	.....	Wh, Lpc.
10cdb	Sven Bervik	144	4	Dr	1961	60	1962	D	Sd	C,E	.....	Wh, L.
10cdc	Chris Madsen	16	36	Du	1956	13	1962	D,S	..	C,H	.....	Ws.
12bcb ₁	Wm. E. Herman	15	18	B	....	11	1962	S	Gv	C,E	.....	Wh.
12bcb ₂	..do...	60	8	B	1951	50	1962	D	..	C,E	.....	Wh (820 ppm).
12cbb ₁	Emanuel Maeirt	60	4	Dr	1943	48	1962	S	Gv	C,W	.....	Wh.
12cbb ₂	..do...	60	4	Dr	1952	50	1962	D	Gv	J,E	.....	Wh.
13caa	Claire Bjorgen	85	6	Dr	....	63	1962	D,S	..	..	.....	Wh.
22ddc	Alden Hanson	70	4	Dr	1959	55	1962	D,S	Gv	C,E	.....	Wh.
23dcd	John Tommerup	75	6	Dr	....	..	....	D,S	Gv	E	.....	Wh, C.
25bbb	USGS Test hole 3007	180	4.5	Dr	1963	..	....	N	..	..	2,133	L.
25ddd ₁	Jonas Jensen	38	44	Du	....	12	1962	D,S	..	..	.....	Ws.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>162-103</u> Cont.												
25ddd ₂	Jonas Jensen	28	24	..	....	18	1962	D,S	..	...	.....	Ws.
26bbb	Alden Hanson	79	4	Dr	1952	58.5	8-27-62	S	Sd	N	.....	Wh.
27aaa	Elmer M. Freund	65	6	B	1930	60	1962	D	Sd	C,E	.....	Ws.
34add	Lloyd Kittelson	70	6	Dr	1945	5	1962	D,S	..	E	.....	Wh.
<u>163-95</u>												
1dcd ₁	Joos Bros.	190	6-3	Dr	1907	55	1946	S	..	C,W	1,906	C.
1dcd ₂	..do...	27	6	B	1952	8.51	7-24-63	N	..	C,H	1,907	
3ccb	Earl Brenno	60	18	B	....	29.59	7-24-63	S	..	C,W	1,905	Lpc.
4bdb	Dea & Rose Light	90	24	B	....	36.54	8-21-46	N	..	C,W	1,901	Lpc.
7cbb	George Kostek	35	36	Du	....	31.98	8-21-46	D,S	..	C,H	1,905	
7ccb	Earl Brenno	60	6	..	....	30	1962	S	..	..	.....	Wh, Wal.
9bc	Sparton Oil Co.	6,725	..	Dr	1957	..	....	..	..	..	.....	C.
12bb	Kindred State Bank	..	28	..	....	77.72	8-20-46	N	..	C,N	1,896	
14daa	LeRoy O. Throntveit	120	6	Dr	1903	24.20	7-24-63	N	..	C,W	1,905	C.
15dd	Eric Johnson	200	5	Dr	....	28.61	8-21-46	N	..	C,N	1,911	
15ddd	USGS test hole	100	4.5	Dr	1947	..	....	..	..	....	1,907	L, MB.
16aaa ₁	Frank Lukach	111	4	Dr	....	20	1962	D,S	..	C,E	1,905	Ws, Wal.
16aaa ₂	..do...	109	4	Dr	....	20	1962	D,S	..	..	.....	Ws, Wal.
17baa	Orrin Lien	41	16	B	....	20	1962	D	..	C,W	1,905	
18bcd	Milo Dahlke	143	5	Dr	....	11.51	7-23-63	N	..	C,W	1,900	Ws, Wal, C.
23bcc	A. F. Kimball	120	3	Dr	....	30	1947	N	..	..	1,906	Hp, C.
26bab	Merle Gunlock	65	6	Dr	....	21.38	9-20-46	D,S	..	C,E	1,911	Hp.
27bdb	Northwest Oil Co.	2,235	..	Dr	....	..	....	N	..	..	1,910	L, MB.
28cab	Emma Ringdahl	42	4	Dr	....	18	1962	S	..	..	.....
29a	Continental Oil Co.	7,064	..	Dr	1963	..	....	..	..	..	.....	C.
29ccd	N. P. Loucks	42	18	B	....	32	1946	S	..	C,W	1,921	Lpc.
29ddd	USGS Test hole	130	4.5	Dr	1947	..	....	N	..	..	1,916	L, MB.
30ddd	Clayton Loucks	38	18	B	1943	28.47	7-23-63	D,S	..	C,E	1,925	

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>163-95</u> Cont.												
31cdc	Henry Lien	44	18	B	....	10	1963	D,S	..	C,H	1,940	Lpc.
31dad	Clarence Anseth	69	3	Dr	1953	32	1953	D,S	..	C,E	1,940	Ws.
32bcd	R. Rivers	119	8	Dr	....	22.40	7-23-63	N	..	C,H	1,932	
32bdd	John Pharoah	63	3	Dr	1953	8.07	7-24-63	D	..	C,E	1,930	
32ddd	Archie Bordeaux	61	6	Dr	1921	41	1963	D	..	C,E	1,931	Ws, C.
33abb	Edwin Ringdahl	20	18	Du	....	12.14	7-24-63	D,S	..	C,W	1,916	
34bcc	A. C. Lumsden	16	12	Du	....	11.53	7-24-63	D,S	..	C,H	1,926	
34dcd ₁	Rudolph Jonnson	20	60	Du	....	10.39	7-24-63	S	..	C,H	1,931	
34dcd ₂	..do...	20	48	Du	1920	6	1963	D	..	E	.....
35cac	Maurice Johnson	12	1.25	Dr	1962	7	1963	S	..	C,E	.....	Wal, Lpc.
<u>163-96</u>												
1bcc	USGS Test hole 3020	75	4.5	Dr	1963	..	....	N	..	...	1,875	L.
1cdd	John Kostek	237	6	Dr	....	40	1946	N	..	N	.....	C.
2aad	Miller Bros.	15	36	Du	....	11.86	7-17-63	D,S	..	E	.....
2cdd	Melvin Stokke	16	30	B	1958	8	1962	D,S	..	E	1,900	Lpc.
3dda	James Rosenquist	22	24	B	1963	19.24	7-17-63	S	..	C,E	1,891	
4dda ₁	M. B. Truax	30	30	B	1961	24	1963	S	..	C,E	.....	Lpc.
4dda ₂	..do...	40	18	B	....	21.36	7-17-63	D	Sd & C1	C,H	1,891	
5aaa	USGS test hole	200	4.5	Dr	1947	8.58	6-16-47	N	..	...	1,881	L, MB.
5abb ₁	Emil Hector	86	18	B	....	53.19	7-17-63	Sp	..	C,H	1,892	
5abb ₂	..do...	20	24	Du	....	18	1963	D	Gv	J,E	.....	Wh, yield 10 gpm.
5ccb	Francis Bacon	50	18	B	....	27.04	7-17-63	N	..	C,H	1,900	
6aad	Gordon Hector	205	6	Dr	1915	71.72	7-17-63	D,S	..	C,E	1,895	Wh, C.
7abb	A. J. Aaberg	40	12	B	1939	16.92	7-17-63	S	..	C,E	.....
7abc	..do...	42	18	B	1946	21	1963	D	..	Cen,E	.....	Wh, yield 20 gpm.
11ccc	Joe Kostek	30	48	Du	....	18	1963	D,S	..	C,W	.....
12aac	George Kostek	28	8	B	12	1963	D	..	C,H	Yield 45 gals in 12 hrs.
12baa	Andrew Kostek	50	24	B	28	1962	S	..	C,E	1,898	Lpc.

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	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	163-96 Cont.												
	12bab	Andrew Kostek	30	24	B	22	1962	D,S	..	C,W	1,898	
	13daa	Perry Baker	105	5	Dr	....	50	1962	S	..	C,W	1,905	C.
	14abb	George Rait	25	48	Du	....	15	1962	D	..	C,E	1,891	Wh, Wal.
	14ddc	Orvil Fagerland	41	4	Dr	1958	20	....	S	..	....	....
	15bab	G. T. Hoversten	56	4	Dr	1957	25.75	7-18-63	D,S	..	....	....	Wal, Lpc.
	15ddd	USGS test hole	430	4.5	Dr	1947	1.05	6-17-47	N	..	....	1,907	L, MB.
	16baa	Gordon Brady	85	4	Dr	1962	22.12	7-18-62	S	Sd & Gv	Sub,E	....
	18abb	Seymore Johnson	150	6	Dr	....	37.7	8-15-46	N	..	N	1,924	
	19bbbd	L. M. Huset	480	3-1.25	Dr	....	21.39	8-15-46	N	Sd	N	1,920	
	25aad ₁	Kay Larsen	24	24	Du	....	14.88	7-18-63	D,S	..	C,E	1,901	
of	25aad ₂	..do...	24	24	Du	....	15	1963	D,S	..	C,E	1,901	
	25abb	..do...	14	72	Du	....	5	1962	S	..	....	....
	26bcc	Perry Rosenquist	24	15	B	....	9	1962	S	..	C,H1	....	Wal.
	27adc	W. S. French	13	28	Du	....	9.18	7-18-63	S	Sd	C,H	1,908	
	28aba	J. U. Baker	205	6	Dr	1914	125	1961	D,S	..	C,W/G	....
	29add	C. V. Brady	75	6	Dr	1953	30	1963	N	..	N	....	Wh.
	29cda	LeRoy Brady	24	28	Du	....	15.08	8-13-46	N	..	C,H	....
	29dce ₁	John Brady	35	18	B	....	12.47	8-14-51	N	..	C,W	1,911	
	29dce ₂	..do...	33	30	B	1960	15	1963	N	..	....	....
	29ddd	USGS test hole	336	4.5	Dr	1947	2.98	8-16-47	N	..	....	1,905	L, MB.
	31acd	Harvey Jacobson	63	4	Dr	1950	28	1963	N	Sd	N	1,941	
	31adc	..do...	35	60	Du	28	1963	D,S	Sd	C/JE	1,942	
	31dca	H. E. Jacobson	50	18	B	35	1963	D,S	..	C,E	1,932	

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>163-96</u> Cont.												
33ccb	Oscar Svangstu	72	4	Dr	20	1963	S	Gr & Sd	C,E	
33ccc	USGS Test hole 3023	120	4.5	Dr	1963	..	....	..	..	..	1,927	L.
35cdc	Arthur & Elsie Holte	50	18	B	....	24.40	7-18-63	N	..	..	.....
<u>163-97</u>												
3adb1	USGS Test hole 3024	430	4.5	Dr	1963	..	....	N	..	..	1,890	L.
3adb2	S. B. Knutson	50	14	B	....	24.45	8-15-46	D	..	C,G	1,875	
3cbb	Ivan Erickson	84	18	B	....	20	1946	D,S	..	air,E	1,914	
4adb	Jennie Wilson Heirs	30	18	B	....	13.40	8-7-46	N	..	..	1,892	
4cbc	Lowell Knudson	315	5-3	Dr	1915	Flow	1963	N	..	..	1,900	Gas in water, C.
4daa	USGS Test hole 3019	240	4.5	Dr	1963	..	....	N	..	..	1,885	L.
5adb	Crosby Golf Club	200	3	Dr	1950	Flow	1963	Pa	..	..	1,890	Wh, C.
5ccc	Violet Thvedt	250	8	Dr	1912	0.48	6-28-63	N	..	N	1,927	
6ccd	J. A. Poling	240	4	Dr	....	Flow	1962	N	..	N	1,930	10 gph, C.
6dcd	Violet Thvedt	253	5	Dr	....	Flow	1963	N	..	N	1,927	10 gph, C.
7dda	Nels Thompson	162	2	Dr	1916	Flow	1963	D,S	..	N	1,933	.5 gpm, C.
8ddb	Paul Gilbertson	220	4	Dr	1950	5	1963	D,S	Sd	C,E	1,930	
10ccb	Rubbina Berotic	32	12	B	....	15.40	7-16-63	D,S	..	C,H	1,917	Lpc.
13ccc	USGS Test hole	459	4.5	B	....	Flow	1947	N	..	..	1,927	L, C, MB.
14aaa	J. E. Gallagher	60	12	B	....	30	1962	S	..	C,G	1,920	
14cbc	Grover Peterson	12	12	Du	....	7.75	8-16-63	N	..	C,H	1,908	
17odd	B. J. & E. Elsbernd	370	5	Dr	....	Flow	1963	N	..	..	1,952	C.
19adc	Anna Semingson	38	18	B	....	27.91	6-28-63	N	..	C,N	1,971	
19ccc1	LeRoy Throntveit	415	2.5	Dr	1962	Flow	1963	S	..	..	1,972	Flows 1.5 gpm.
19ccc2	..do...	32	18	B	....	25	1963	D	..	C,E	1,977	Lpc.
19dad	Lynn Roberts	210	4	Dr	1956	Flow	1963	D,S	..	..	1,967	
20aab	Sam Burner	30	24	B	...	8.27	6-28-63	N	..	C,H	1,937	
22cdc1	Idor Jacobson	28.6	24	B	....	15	1962	S	..	C,H	1,938	
22cdc2	..do...	23.9	18	B	....	19.43	7-16-63	D	..	C,G	.....
22cdc3	..do...	562	1.5 3.5 2.5	Dr	1943	12	1963	S	..	C,E	.....	Ws, C.
23dcd	R. Gjovig	31	48	Du	....	25	1962	S	..	C,E	1,935	Wal.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>163-97</u> Cont.												
26bbb	USGS Test hole	438	4.5	Dr	1947	Flow	1947	T	..	...	1,944	L, C, MB.
27ccb	Frank Winhofer	455	3	Dr	1929	4	1963	S	..	C,G	1,957	C.
28add	James Gallagher	22	7	B	....	8	1962	D	..	...	.....
29ddb	City of Crosby	38	..	Du	....	28	1962	N	..	C,H	.....	C.
30abb	USGS Test hole 3017	200	4.5	Dr	1963	..	....	N	..	...	1,963	L.
30ccd	Hans Drengsrud	55	24	B	1942	31.59	6-28-63	D,S	..	C,H	1,990	
31bcb	Archie Peterson	350	3	Dr	....	Flow	1963	D,S	..	C	1,993	C.
33baa	Kenneth Odgaard	60	24	B	....	25	1963	S	..	C,E	.....	Wal.
33ccc	USGS Test hole	521	4.5	Dr	1947	1.74	6-25-47	N	..	...	1,977	L, MB.
33ddc	James Peterson	40	12	B	....	25	1963	S	..	C,E	.....	Wh, Lpc.
34aac	City of Crosby, Well 1	296	12	Dr	1941	Flow	1963	Ps	..	Tu,E	1,960	Yield 74 gpm, L, G P 160.
34ada	City of Crosby, Well 2	390	6	Dr	1948	80	1962	Ps	..	Sub, E	.....	L, C.
34cdd	O. T. Olson	16	24	Du	....	7.98	8-9-46	D	..	C,H	1,977	
35bab1	Minnie Volkman	275	2	Dr	1918	+15	1946	N	..	...	1,958	C.
35bab2	..do...	298	2.5	Dr	1949	Flow	1963	N	..	...	.....	C.
35bca	City of Crosby, Well 3	310	12	Dr	....	Flow	1963	Ps	..	Tu,E	1,956	P1 30 ft. @ 290 gpm 1962, C.
<u>163-98</u>												
1adc	Ralph Wanner	280	6	Dr	1915	Flow	1962	D	Sd & Gv	...	1,932	Ws, C.
4bcc	Harold Hanson	40	24	B	....	30	1962	S	..	C,E	.....	Wh.
4ddc	Rolf Eriksmoen	33	16	B	1940	13.23	7-1-63	S	..	C,E	1,980	Wh, Wal.
5ccd	Kristian Torreson	30	24	B	1907	6	1962	D,S	..	C,E	2,002	Ws.
8aba	R. W. & Charles Bublitz	30	36	Du	....	10	1962	S	..	C,H	1,982	
9cba	Boyd Fossum Springs	..	..	..	....	Flow	1963	S	..	...	.....
10abb1	Arnold Hagen	300	4	Dr	1920	Flow	1962	D,S	..	...	1,967	Ws.
10abb2	..do...	280	4	Dr	1950's	Flow	1963	D,S	..	...	1,967	Ws.
11aaa	Christ Wanner	19	6	..	....	9	1962	S	..	C	1,936	Wh.
13ccc1	Kenneth Haugland	18'	48	Du	....	12	1962	D	Gv	C,E	.....	Wh.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
163-98 Cont.												
13ccc ₂	Kenneth Haugland	12	48	Du	....	8	1962	S	Gv	C	.....	Wh.
14ccd	Alf Paulson	20	18	Du	....	7	1963	D	..	...	.....	Wh.
14cdc	..do...	36	36	Du	....	6.75	7-1-63	D	..	C	2,024	Wh.
15add	Henry Ericksmoen	25	36	Du	....	4.60	7-1-63	D,S	..	P,H	1,965	Wh, Wal.
15baa	Martin Fossum	22	24	B	....	18	1962	D,S	..	P,H	1,971	Wh.
16ddd	Goodwin Haugland	40	18	B	1959	20	1963	D,S	..	C,E	2,060	Wh.
17aab	E. Hanson	70	4	Dr	1962	30	1963	S	Lig	Sub,E	2,100	Ws, C.
17bbb	..do...	183	3	Dr	1920	9.16	6-24-63	O	..	N	2,102	T ₃ .
18cdc ₁	Olaf Henning	35	24	B	....	26.86	8-16-62	Ps	Sd	C,E	2,155	City of Ambrose.
18cdc ₂	..do...	35	24	B	....	27	1962	Ps	Sd	C,E	2,155	..do...
19aac	Ida Peterson	50	30	B	....	31.3	5-1-47	D	..	C,H	2,175	
21bbb	Edward Sims	60	24	B	....	30	1962	D	..	C,W	2,145	Wh, C.
21ddc	George Haugland	21	36	Du	....	12	1963	D,S	..	C,E	2,082	Wh.
22baa	Kenneth Unhjem	222	4-3	Dr	1962	Flow	1963	D,S	Sd	N	2,032	Flows 2 gpm, Ws, C
22dda	Willie Christianson	68	5	Dr	....	30	1962	D,S	Gv	C,E	.....	Wh.
23ad	Earl Elsbernd	40	18	B	....	15.15	8-6-46	D	..	C,W	1,969	Wh.
23ddd	Ed Thompson	320	6	Dr	....	18	1963	N	..	...	.....	C.
24ddd	Gust Westby	60	12	B	....	26.22	8-28-46	N	..	N	1,980	
25aaa	Edward Overbo	60	24	B	1962	35.75	6-28-63	S	..	C,E	.....
25bbb	E. B. Andreason	318	2	Dr	....	Flow	1963	D,S	..	N	.....	15 gpm, Ws, C.
26bbb	K. H. Knutson	14	48	Du	....	9.50	6-29-63	D	..	C,E	2,032	
26cdc	Arthur Simonson	290	1.5	Dr	1916	Flow	1963	D,S	..	...	2,054	Wh (290 ppm), C.
27odd	George Lakken	360	10	Dr	1917	5	1962	S	..	C,E	2,103	Ws, C.
29ccc	Wallace Carlslaf	160	8	Dr	....	120	1962	S	..	C,W	.....	Wh.
30aba	T. Rue	160	6	Dr	....	62.80	6-1-63	N	..	C,N	2,172	Wh, C.
30bba	S. Hammer	180	5	Dr	....	65	1963	S	..	C,W	2,184	Wh, C.
32aba	O. Haugo	498	3	Dr	....	75	1946	N	..	...	2,189	C.
35aba ₁	Emil Oien	28	12	B	....	18	1963	D	Gv	E	2,030	Wh.
35aba ₂	..do...	18	48	Du	....	10	1962	S	Gv	...	.....
35ccc	Hulda Endahl	60	24	B	....	25	1962	D	..	C,W	2,083	Wh.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
163-99												
28dd	Wm. Bailard	308	3-2.5	Dr	1927	Flow	1963	D	..	E	2,040	Flows 20 gph, Wal, C.
3ddd	Alva Myers	300	4	Dr	....	Flow	1963	N	..	...	.....	Ws.
7bce	J. D. Torgerson	20	24	Du	....	3.05	5-30-63	N	..	C,H	.....	.....
10bba	Alton Hondrom	215	4	Dr	1945	1	1963	D	..	C,H	.....	Wh, C.
10cda	James Myers	205	5	Dr	1915	50	1963	D,S	..	C,E	.....	Ws, Lpc.
10dde	Eman Enerson	156	6	Dr	....	Flow	"	D	..	...	.....	Flows 8 gph, Ws.
11cdd	..do...	260	5	Dr	1928	Flow	1963	Pa	..	N	2,033	18 gpm, Ws, C.
12cbc	Good Samaritan Home	272	3-2	Dr	....	Flow	1963	Pa	..	E	2,062	.....
12cca1	City of Ambrose	318	4	Dr	1951	Flow	1963	Pa	..	N	2,063	Ws, C.
12cca2	Delbert Jensen	50	4	Dr	1962	12	1962	N	..	N	.....	C.
12cca3	..do...	300	4	Dr	1962	Flow	1963	Pa	..	N	2,063	C.
13abb	Howard Norby	200	6	Dr	....	Flow	1962	D,S	..	...	2,078	1 gpm, C.
14caa	Mrs. A. Bakke	365	..	Dr	....	25	1962	S	..	C,W	2,133	.....
15cdb	Murry Torgeson	18	6	B	....	10	1962	D,S	..	Sen,E	.....	Wh.
17aaa	USGS Test hole 3014	340	4.5	Dr	1963	..	....	N	..	...	2,092	L.
17dcd	Bennie Paulson	135	18	B	1914	19.77	9-18-62	S	..	C,G	.....	Wal.
18aaa	USGS Test hole 3013	95	1.25	Dr	1963	34.15	6-12-63	O	..	...	2,105	Td 120, L, T3, C.
19aaa	Kenneth Monson	200	6	Dr	1918	75	1962	D,S	..	C,E	.....	Np.
21bac	Steen Paulson	150	12	B	1915	38	1962	D,S	Sd	C,E	.....	Wh.
22daa	Charles Bublitz	20	6	Du	1958	10	1962	D	Sd	C,E	.....	Wh.
22dab	..do...	25	6	Du	1957	8	1962	S	Sd	C,E	.....	C.
23aab	Raymond Ness	418	4	Dr	1920	120	1962	D	..	C,E	2,163	Ws, Lpc, C.
24bbb	Roy Arnold	400	2	Dr	1912	60	1934	N	..	...	2,164	C.
26dab	Lars Windfeldt	40	24	B	1943	39	1963	D,S	..	C,H	.....	Wh.
27dbc	Orvil Vassen	274	4	Dr	1954	160	1962	D,S	..	...	.....	Ws.
28bac	Clifford Granrud	450	4	Dr	125	1962	N	..	C,N	Ws.
29daa	..do...	21	18	B	1948	10	1962	D	..	C,H
31ddd	V. M. Porth	18	32	Du	12	1962	D,S	Wh.

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>163-92</u> Cont.												
33acc	Oscar Selle	80	48	Du	1958	3.58	9-12-62	S	..	C,E	
33bdd	..do...	30	24	B	1961	26.85	9-12-62	D,S	..	E	.....	Wh.
33cdd	..do...	6	24	B	1960	5	1962	S	..	C,H	.....
35bcb	Vassen Bros.	196	4	Dr	1962	80	1963	D,S	..	Sub,E	.....	Wh, Lpc, L, C.
35daa	Robert Grundstad	30	36	Du	....	15	1963	S	Sd	Sub,E	.....	Wh.
<u>163-100</u>												
5aaa	Francis Adams	455	4-2	Dr	1930	50	1963	N	Sd	C,N	.....
5dda1	Mrs. Capitola Haagenon	16	33	Du	1957	8	1963	D	..	E	.....	Wh.
5dda2	..do...	21	24	B	1957	9	1959	S	..	C	.....	Wal.
6bbb	Mangus Hagberg	12	36	B	....	2.50	5-30-63	N	..	C,H	.....
7bb	Lloyd Hagberg	7	48	Du	....	5	1963	S	..	C,H	.....
7caa	Frank Jordan	40	24	B	1933	11.74	5-30-63	D	..	C,H	.....
8dad	R. J & A. W. Wolter	12	36	B	1955	4	1959	S	..	C,H	.....	Wh, Wal.
9aaa	USGS Test hole 3077	140	1.25	Dr	1963	43.13	11-3-63	O	Sd	...	2,164	Td 475, L, T ₃ , C.
11ddd	H. R. Gulbranson	20	18	B	1958	4	1963	D	..	C,H	.....
12ddc	J. A. Johnson	14	24	Du	1912	10	1963	..	Sd	...	.....	Wal.
13bbb	USGS Test hole 3076	415	4.5	Dr	1963	..	....	N	..	...	2,125	L.
14aac	Village of Colgan	21	36	B	1936	19	1949	Ps	Sd	C,H	2,120	C.
20bab	B. A. Simonson	640	5-3	Dr	....	110	1950	N	Sd	C,W	.....
20bac	..do...	125	4	Dr	....	90	1963	S	..	C,E	.....	L.
20dbc	Frank Mosser	188	4	Dr	1947	Flow	1963	D,S	Gv	Gen,E	.....	Wh, L, C.
21bab	Ralph Wolter	606	3	Dr	1933	150	1962	D,S	..	C,E	.....	Ws.
22daa	Leonard Rollofson	86	18	B	....	35	1962	S	..	...	.....	Wal.
24cdd	Sherman Lampert	74	4-3	Dr	....	16	1962	S	Gv	C,E	.....	Wh.
30ddd	Swan Nelson	17	48	Du	....	31	5-29-63	S	..	...	.....
31aab ₁	Julius Havorson	637	3-2	Dr	1920	0	1934	N	Sd	N	.....

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
163-100 Cont.												
31aab2	Julius Halvorson	30	18	B	1948	10	1962	D	..	E	.....	Wh, Np, C.
31daa	USGS Test hole 3012	520	4.5	Dr	1963	..	....	N	..	...	2,123	L.
32abb	Earl Jeglum	650	3-2	Dr	1922	350	1934	S	Lig	C,W	.....	Wal.
32ddd	Wallace Murphy	23	13	B	1951	9	1963	D,S	..	C,E	.....	Wh, Wal.
34aaa	Evald Lindel	23	23	Du	....	14.26	5-31-63	D,S	..	C,H	.....	Wh.
35bc	Lowell Larson	15	48	Du	....	10	1962	S	..	...	.....
35bcb	..do...	90	24	B	....	50	1962	S	..	C	.....
35daa	Melvin & Alfred Moe	90	24	B	....	50	1963	S	Sd	C,W	.....
1aaa	Mangus Hagberg	6	48	Du	....	2.25	5-30-63	S	..	C,H	.....
1baa	Silas Haagenson	13.7	48	Du	....	7.25	5-30-63	S	..	C,H	.....
2add	Christianson Bros.	147	4	Dr	1947	50	1962	S	..	C,E	.....	Wh, Lpc.
4acb	Bland Carter	Spring	..	..	....	Flow	1963	S	..	...	.....	Flows less than 1 gpm, Wh.
4ccd	..do...	64	4	Dr	1920	16	1963	D	..	C,E	.....	Wh.
10dda	J. M. & A. W. Cashman	67	24	B	1937	25	1963	S	..	C,E	.....	Wh.
11daa	George Seyfert	24	24	Du	1953	6	1962	N	Gv	C,N	.....	Np.
12acc	Richard Brown	21	36	Du	....	13.89	5-30-63	D,S	..	C,E	.....	Wh.
14ada	George Seyfert	24	24	B	....	12	1963	S	..	C,E	.....
16abc	School land	Spring	..	..	....	F	1963	S	..	...	.....
22cbd	Ole Hellen	12	52	Du	....	6	1963	D,S	..	Cen,E	.....	Yield 6 gpm, ws.
22cdc	John Leininger	8	120	Du	....	Flow	1963	Ps,S	..	Cen,E	.....	3 gpm,C.
24caa	Emil Asleson	600	6-4	Dr	1915	170	1963	S	Gv	C,E	.....	C.
25aab	Adolph Asleson	60	4	Dr	1947	Flow	1963	S	..	...	.....	Wal, Np.
26bcc	August Feil	635	3.5,2.5Dr	....	1918	80	1920	N	..	...	.....
27ddb	Village of Fortuna, test 1	240	..	..	....	..	....	..	..	...	.....	L.
29dba	Robert Mantei	..	60	Du	....	9.98	5-28-63	S	..	C,W	.....
31daa	Robert Constantine	21.0	30	Du	....	10.90	5-28-63	S	..	C,E	.....
33dab	Margaret Legaard	15	36	Du	....	11.05	5-28-63	S	..	C	.....	Wh, Wal.
35aab	Porter Wigness	60	18	B	....	30	1963	N	..	N	.....	Wal.
35add	C. R. Henderson	81	4	Dr	1946	30	1962	S	..	C,E	.....	L.

NS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>163-101</u> Cont.												
35cac ₁	Village of Fortuna, well 1	20	36	Du	....	6	1964	Ps	Sd & Gv	E	.....	C.
35cac ₂	Village of Fortuna, test 2	100	..	Dr	1962	..	....	T	..	...	.....	L.
35cac ₃	Village of Fortuna, well 3	91	4	Dr	1962	..	....	Ps	Sd & Gv	Sub,E	.....
35cac ₄	Village of Fortuna, test 3	100	4.5	Dr	1962	..	....	T	..	...	.....	L,C.
35cac ₅	Village of Fortuna, test 4	100	4.5	Dr	1962	..	....	T	..	N	.....	L.
35cbb	USGS Test hole 3075	240	1.25	Dr	1963	20.67	11-13-63	O	..	N	2,265	Td 665, L, T ₃ .
												C.
35cbc	Village of Fortuna, test 6	120	4.5	Dr	1964	..	....	T	Sd	N	.....	L.
35cca	Village of Fortuna, well 2	28	36	Du	....	6	1964	Ps	Sd & Gv	E	.....	Casings pulled, L.
35ccb ₁	Village of Fortuna, test 5	120	4	Dr	1963	10.79	10-8-63	O	Sd	...	.....
35ccb ₂	Village of Fortuna, well 4	106	4	D	1964	12	1964	Ps	Sd	Sub,E	.....	Td 135, L.
<u>163-102</u>												
2bas	Stanley Tangedal	170	4	Dr	....	135	1962	D,S	..	C	.....	L.
3ada ₁	Curtis Tangedal	39.8	18	B	....	9.7	9-11-62	N	..	C,H	.....
3ada ₂	..do...	93	24	..	....	90	1962	D,S	..	...	.....
3dda ₁	Emmett Drawbond	78	5	Dr	1953	48	1953	Sp	..	E	.....	Wh, Lpc.
3dda ₂	..do...	77	5	Dr	1961	65	1962	D	..	C,E	.....	Wh, L.
6aab	Selmer Ekness	45	24	B	....	35	1962	D,S	..	...	.....	Wh.
6cdb	Dallas Moore	80	12	B	1935	25	1962	D,S	Sd	C,G	.....	Wh, C.
10cdd	Joseph Drawbond	34	6	Dr	1962	20	1962	D	Gv	J,E	.....	Wh (342 ppm), Wal.
11dac	Skjermo Bros.	110	5	Dr	1963	63	1963	D,S	Sd	C,E	.....	C.
13aad	USGS Test hole 3008	250	4.5	Dr	1963	6	1963	N	..	...	2,113	
15abb	Sam Drawbond	40	12	B	1930	30	1962	N	Gv	C,W	.....	Wh.
18ccc	Sven Bervik	53	24	B	....	50	1962	D,S	..	C,W	.....
20bb	Earl Moore	35	12	B	....	30	1962	S	..	...	.....
24cdc	G. F. Wehrman	140	4	Dr	1944	17	1962	S	..	C,E	.....	Wh, Wal.
25bab	Harold Scheff	190	4	Dr	1945	100	1962	S	Sd	C,E	.....	Wh, Np, Lpc.
29ccc	Jens Pederson	36	24	B	....	32	1962	D,S	..	...	.....
31bba	Orien Olson	57	24	B	1934	39	1962	D,S	..	E	.....	Wh.
31dcc	Olav Gjesdal	52	36	Du	1914	Flow	9-10-62	N	..	J,N	.....	Wh, Lpc.
32dc	..do...	186	5	Dr	1954	25	1959	N	Gv	...	.....

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>163-102</u> Cont.												
33cdc ₁	USGS Test hole 3010	40	3	Dr	1963	Flow	1963	..	Gv	N	2,055	150 gpm at 10 inches above 1s,
33cdd ₁	USGS Test hole 2244	190	1.25	Dr	1964	10.66	6-24-64	0	Gv	N	2,077	Td 220, L, T ₃ , C.
33cdd ₂	USGS Observation well	73	1.25	Dr	1964	12.46	6-12-64	0	Gv	N	2,078	Td 84, T ₃ .
35dbc	Louis Pulvermacher	98	4	Dr	1950	57	1962	D,S	Sd	E	.....	Wh, L.
36acb	US Air Force	400	12	Dr	....	108	9-16-62	Ps	..	Tu,E	2,330	Yields 60 gpm, L,C.
<u>163-103</u>												
11aba	Oscar Bjorgen	103	4	Dr	1956	24.90	10-15-63	D,S	Sd	J,W	.....	Wh.
11bba	A. O. Bryn	11	1.5	Dr	1953	9	1962	D	..	C,H	.....	Wh, Lpc.
11ddd	USGS Test hole 2243	241	4.5	Dr	1964	..	....	N	..	..	2,087	L.
12cbc	Kristina Nelson	27.2	24	B	....	15.1	9-7-63	N	..	N	.....	..
15cdc	Gertie Taugedal	48	12	B	....	44	1962	D,S	Gv	..	.....	Wh.
23dda	Lyle Bjorgen	12	36	Du	1940	8	1962	D	Gv	J,E	.....	Wh.
25cbb	Laverne Peterson	13	48x36	Du	....	10	1962	D,S	..	..	.....	..
27adc	Wm. F. Anhalt	60	4	Dr	....	30	1962	D	..	..	.....	..
36cdc	USGS Test hole 3009	120	4.5	Dr	1963	..	....	..	..	..	2,115	L.
<u>164-95</u>												
28a	U. S. Border Station	165	6	Dr	....	50	1962	D	..	Sub,E	1,897	C.
29cc	Joe Burner	138	6	Dr	1928	60	1960	D,S	..	C,G	1,896	C.
33ada	Donald Jacobs	170	36	Du	....	11.69	7-23-63	D	..	Sen,E	.....	Wh.
33add	Henry Jacobs	25	36	Du	1945	14.95	8-20-46	D,S	..	C,E	.....	Wh.
33ddd	J. C. Anderson	140	3	Dr	....	40	1962	S	Sd	C,W	1,904	Wa,C.
34ada	Emmet Gausvick	30	18	B	....	10	1962	N	..	N	1,900	Wh.
34ddd	Mrs. George Rait	90	6	Dr	....	65	1963	S	..	C,H	.....	..
35bdc	John Matz	45	36	Du	....	31	1962	D	..	C,H	1,896	Wh.
35ddd ₁	C. W. Wissbrod	130	5	Dr	....	30	1962	S	..	C,W	1,905	Wh, Wal, C.
35ddd ₂	..do...	54	18	B	1950	38	1963	D	..	J,E	.....	Wal, Np.
36ddd	Joseph Lukach	92	3	Dr	....	18	1963	D,S	..	C,E	1,905	L, C.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>164-96</u>												
29a	Harry Wendel	200	6	Dr	1930	88	1962	D,S	..	C,W	1,900	C.
32dcc	Roland Knutson	20	6	Du	....	18	1962	D	..	E	1,890	
34aaa	Einar Borreson	84	4	Dr	....	30	1962	D	..	C,E	1,892	Wh, C.
34cdd	Francis Bacon	133	4	Dr	1957	60	1963	D,S	..	C,E	1,897	Wh, L.
31bcc	E. Hattel	228	4	Dr	....	Flow	1963	D,S	..	C,H	1,910	C.
31daa	USGS Test hole 3018	160	4.5	Dr	1963	..	....	..	..	..	1,890	L.
32ded	T. S. Stuart	184	3	Dr	1949	14	1963	N	Sd	C,E	1,912	L.
33bcc	Ida Landstrom	185	2	Dr	....	10	1963	D,S	..	..	1,915	C.
<u>164-98</u>												
31acc	George Windfaldet	35	16	B	....	20.98	8-14-62	S	..	C,H	1,993	
31dab	O. O. Pederson	20	48	Du	....	10	1962	S	Sd	C,H/E	2,004	Lpc.
32cbb	Michael Kostek	50	18	B	....	40	1962	D	Gv	..	1,995	Wh, Wal.
34cdd	Everett Hanson	250	6	Dr	....	Flow	1963	N	..	..	1,965	Flows about .5. gpm, C.
<u>164-99</u>												
26aa	U. S. Customs Station	480	6	Dr	1931	35	1962	D	..	Sub,E	2,020	Np.
31bcc	Archie Thomte	565	5-2	Dr	1917	70	1963	S	..	C,E	.....	Ws, C.
31ddd ₁	Krist Knutson	600	4	Dr	....	180	1963	D	..	C,E	.....	Ws, Np.
31ddd ₂	..do...	40	24	B	1946	10.72	9-13-62	D	Gv	C,H	.....	Wh.
33abc	Gordon Homdrom	503	3	Dr	1918	31.95	9-11-62	S	Lig	C,E	.....
35add	Leonard Moen	500	6	Dr	....	44	1962	D,S	..	C	2,035	
28cd	John Muzzy	15	48	Du	....	3.42	5-28-63	N	..	C,H	.....
33ddd	Tiddles Smith	647	3	Dr	....	..	....	D,S	Sd	C,W	.....
35add	George J. Fernbaugh	780	2	Dr	1917	..	....	D	..	C,W/E	.....	Ws.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>164-101</u>												
28bc ₁	U. S. Custom Station, no. 1	205	4	Dr	1962	192.5	5-18-63	N	..	...	2,085	Td 220, L, C, went dry.
28bc2	U. S. Custom Station, no. 2	239	4	Dr	1963	..	....	N	..	Sub,E	2,085	Td 245, L, C, went dry.
35bcc	John Haapalakso	135	4	Dr	....	12	1962	S	Sd & Gv	...	.....
<u>164-102</u>												
32dcc	Erling Tangedal	188	4	Dr	1956	50	1962	D	..	C,E	.....	Wh.
33bbb	..do...	177	4	Dr	1956	40	1962	S	Gv	C,W	.....	Wal.
34dbd	George Pederson	55	24	B	....	35	1962	S	..	C,W	.....	Wh.
34dca	..do...	210	4	Dr	1961	200	1961	D,S	Gv	C,E	.....	Wh.

TABLE 2.--Logs of wells and test holes

160-95-22aad
Test hole 3000

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Sand, clayey, very fine to very coarse, unsorted, very calcareous-----	6	6
	Gravel, medium sand to small pebbles, subangular; pebbles predominantly limestone and quartz----	7	13
	Till, dark greenish-gray-----	12	25
	Clay, silty, greenish-gray, very calcareous-----	14	39
	Till, dark-greenish-gray-----	21	60
	Till, light-olive-brown, oxidized-----	30	90
	Till, light-olive-brown to dark-greenish-gray, partly oxidized-----	10	100
Tongue River Formation:			
	Sand, very fine, moderate dark-yellowish-orange, subrounded to well-rounded, oxidized-----	49	149
	Shale, light gray-----	5	154
	Lignite, black-----	4	158
	Clay-----	2	160

160-96-26bbb
Test hole 3001

Glacial drift:	Soil-----	2	2
	Sand, coarse, oxidized-----	15	17
	Silt, dark-yellowish-orange, oxidized, calcareous	3	20
	Silt, dark-greenish-gray-----	23	43
	Gravel and sand, fine sand to medium gravel, sub- rounded; abundant limestone, quartz and igneous pebbles-----	10	53
	Till, dark-greenish-gray-----	34	87
	Till, moderate-yellowish-brown, oxidized; contains some shale, limestone and a few lignite frag- ments-----	23	110
	Till, moderate-yellowish-brown and dark-gray----	20	130
	Boulder-----	1	131
	Till, dark-gray and moderately-yellowish-brown---	11	142
	Till, dark-gray; few boulders-----	51	193
	Sand, silty, greenish-gray, fine to very fine, calcareous-----	32	225
	Sandstone and gravel-----	2	227
Tongue River Formation:			
	Shale, silty, greenish-gray-----	13	240

160-97-5abb
Test hole 3036

Glacial drift:	Soil, black, loam-----	1	1
	Clay, yellowish-gray, thinly laminated, oxidized-	2	3
	Till, silty, moderate-olive-brown, oxidized-----	12	15
	Till, silty, light-olive-gray, partly oxidized---	17	32
	Till, silty, olive-gray-----	180	212
	Gravel, fine sand to large pebbles unsorted, sub- angular to subrounded-----	10	222
	Till, silty, olive-gray-----	27	249
	Gravel, fine sand to small pebbles unsorted----	8	257
	Till, olive-gray-----	59	316
Tongue River Formation:			
	Clay, light-gray and light-greenish-gray, cal- careous; some lignite-----	14	330

160-97-13bbb
Test hole 3002

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Soil-----	2	2
	Sand, very coarse-----	5	7
	Sand, silty, very fine-----	13	20
	Silt, dark-greenish-gray-----	25	45
	Clay, shaley, dark-greenish-gray-----	6	51
	Silt, dark-greenish-gray-----	7	58
	Sand and gravel, fine sand to medium gravel, sub- rounded, poorly sorted-----	20	78
	Till, dark-greenish-gray-----	27	105
	Gravel-----	3	108
	Till, dark-greenish-gray-----	7	115
	Silt, sandy, dark-gray and olive-gray, calcareous, few fossil fragments, (dark-gray color due to organic matter)-----	7	122
	Till, dark-yellowish-orange, oxidized; few lime- stone and shale grains-----	17	139
Tongue River Formation:			
	Sand, silty, very fine, oxidized calcareous-----	7	146
	Silt, dark-yellowish-orange, oxidized, (grading downward into) silt, lignitic, dark-greenish- gray to brownish-black-----	12	158
	Limestone-----	2	160

160-97-16acb
Randolph Kettel

(Log furnished by Marinus Jensen)

Clay, sandy and rocks-----	6	6
Clay, brown-----	15	21
Sand-----	2	23
Clay, brown-----	11	34
Clay, blue-----	22	56
Sand, (dry)-----	3	59
Clay, sandy-----	28	87
Gravel-----	3	90
Clay, blue-----	60	150
Sand and gravel-----	20	170
Clay, blue-----	90	260
Missing-----	10	270

160-97-32aac
Albert Pieper

(Log furnished by Schnell Inc.)

Topsoil-----	1	1
Clay, yellow-----	13	14
Clay, gumbo, dark-----	13	27
Till, sandy, gravelly-----	12.5	39.5
Rock-----	.5	40
Clay, gravelly-----	48	88
Sand and gravel with boulders-----	17	105
Clay, layer-----	6	111
Sand, coarse with clay layers-----	7	118
Sand and clay-----	6	124
Gravelly-----	16	140

160-97-32cca
Frank Salveson

(Log furnished by Schnell Inc.)

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
	Sand and gravel-----	14	14
	Clay, blue-----	87	101
	Sand, fine-----	13	114
	Gravel, coarse with lignite-----	19	133
	Clay-----	7	140

160-97-32daa
Observation well 3-862

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Soil, silty, dark, organic-----	1	1
	Clay, silty, white to olive gray, soft, smooth, stickly, leached-----	2	3
	Clay, silty with a little sand, yellowish brown, fairly cohesive, plastic, soft, leached in places, some coal, oxidized (till)-----	10	13
	Clay, silty to sandy, olive gray, cohesive, plastic, oxidized in spots near top-----	86	99
	Sand, coarse and fine to medium gravel, grayish, subangular to subrounded-----	7	106
	Gravel, fine to medium, and coarse sand, contains some coal-----	20	126
	Clay, silty to sandy, olive gray, cohesive, plas- tic (till)-----	6	132

160-97-32dac
Observation well 2-862

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Sand, fine with some medium rusty brown, well sorted, subrounded, oxidized-----	10	10
	Clay, slightly silty, bluish gray, smooth, soft, sticky, plastic, some coal-----	30	40
	Clay, silty to sandy, bluish olive gray, cohesive, some lignite (till)-----	71	111
	Silt, olive-gray, smooth-----	12	123
	Sand, coarse and fine gravel with some medium sand, fairly well sorted, subangular to round- ed; predominantly shale, limestone, igneous, and metamorphic rocks-----	20	143
	Clay, silty to very sandy, olive gray; moderately cohesive, slightly plastic, slightly calcar- eous (till)-----	4	147

160-97-32dca
Frank Salveson

(Log furnished by Schnell Inc.)

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Topsoil-----	1	1
	Sand, dry-----	9	10
	Till (gravelly and sandy clay)-----	115	125
	Sand and gravel-----	28	153
	Clay, gravelly, with thin sand layers-----	32	185
Tongue River Formation:		5	190

160-97-32ddb₁
Frank Salveson

(Log furnished by Schnell Inc.)

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
	Loam, sandy-----	3	3
	Sand and gravel-----	12	15
	Clay, yellow-----	9	24
	Clay, silty, blue-----	20	44
	Clay, gravelly-----	72	116
	Silt, sandy-----	5	121
	Sand and gravel-----	17	138
	Clay with boulders-----	2	140

160-97-32ddb₂
Observation well 1-862

Glacial drift:

	Sand, silty to fine, dark brown-----	3	3
	Clay, silty with some sand, yellowish olive, slightly cohesive, soft, oxidized, slightly calcareous (till)-----	21	24
	Silt, very clayey, olive gray, plastic, slightly calcareous-----	6	30
	Clay, bluish gray, smooth, plastic, sticky, slightly calcareous-----	5	35
	Clay, silty to sandy, olive gray, cohesive, slightly calcareous, (till), some lignite in the till-----	8	43
	Silt, clayey with some very fine sand, olive gray, smooth soft, plastic, slightly calcareous-----	13	56
	Clay, silty to sandy, olive gray, cohesive, lig- nite particles, slightly to moderately cal- careous (till)-----	65	121
	Gravel, fine to medium, angular to subrounded, some olive gray shale; pebbles composed of igneous and metamorphic rocks, limestone, dolomite, and lignite-----	15	136
	Clay, silty to sandy, olive-gray, cohesive, tight (till)-----	6	142

160-97-32ddb₃
Frank Salveson

(Log furnished by Schnell Inc.)

Glacial drift:

	Loam, sandy and topsoil-----	4	4
	Sand and fine gravel-----	10	14
	Clay, yellow-----	7	21
	Clay, silty, blue-----	28	49
	Clay, gravelly with boulders-----	65	114
	Sand-----	4	118
	Sand and gravel-----	22	140
	Clay, gravelly-----	19	159
	Boulders-----	3	162
Fort Union Formation:	Clay, sandy-----	6	168

160-97-33bbd
Leonard Rosten

(Log furnished by Schnell Inc.)

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Loam, topsoil-----	1	1
	Loam, sandy-----	3	4
	Clay, yellow-----	3	7
	Clay, gravelly with boulders-----	80	87
	Sand and gravel with rocks-----	22	109
	Rock-----	.5	109.5
	Clay layer-----	2.5	112
	Coarse sand with thin clay layers-----	15	127
	Clay, sandy (gravelly)-----	31	158
Fort Union Formation:		2	160

160-97-36bb
Test hole 3003

Glacial drift:			
	Soil-----	2	2
	Clay, silt, and sand, light olive brown, unsorted	12	14
	Clay, silty, dark-greenish-gray, slightly calcareous; few selenite crystals-----	20	34
	Till, gravelly, dark-greenish-gray-----	44	78
	Gravel, fine and medium sand, subrounded to well rounded pebbles predominantly quartz and limestone, with some lignite-----	20	98
	Till, gravelly, dark-greenish-gray-----	23	121
	Gravel-----	2	123
	Till, gravelly, dark-greenish-gray-----	18	141
	Silt, dark-greenish-gray, very calcareous-----	2	143
	Gravel-----	3	146
	Till, dark-greenish-gray-----	4	150
	Gravel-----	1	151
	Till, dark-greenish-gray-----	16	167
	Gravel-----	1	168
	Till, dark-greenish-gray-----	76	244
	Sand, very fine to very coarse, and dark-greenish gray silt, abundant lignite particles, calcareous; apparently interbedded-----	29	273
	Sand, very fine, and silt, some clay; interbedded	15	288
	Gravel, granule, sandy, rounded; abundant brownish pebbles-----	6	294
Tongue River Formation:			
	Clay, sandy, bluish gray, hard-----	26	320

160-99-3bbb
Test hole 3016

Glacial drift:			
	Fill-----	7	7
	Silt, sandy, dark-yellowish-brown to moderate-yellowish-brown, calcareous, oxidized-----	3	10
	Till, moderate-yellowish-brown, oxidized, abundant shale pebbles-----	7	17
	Till, dark-yellowish-brown, partly oxidized, abundant shale pebbles-----	13	30
	Silt, dark-greenish-gray, very calcareous, some fine sand-----	10	40
	Till, dark-greenish-gray, abundant shale pebbles-----	32	72
	Silt, sandy, olive to bluish-gray, slightly calcareous; mica flakes-----	3	75

160-99-3bbb--Continued
Test hole 3016

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift--Continued:			
	Lignite-----	1	76
	Sandstone, bluish-gray, a few lignitic areas----- (From 72 to 92 feet appears to be a block of Tongue River sediments)-----	16	92
	Till, olive-gray to black, some lignitic particles	5	97
	Sand, fine to coarse, subrounded-----	55	152
	Till, olive-gray to dark-gray-----	45	197
	Sand (driller and E. log) no sample-----	5	202
	Silt, olive-gray, calcareous, slightly cohesive; contains some very fine sand and clay lenses, (no samples below 220 feet)-----	48	250
	Sand, very coarse, and gravel, granular, sub- angular; minor constituents lignite and pyrite	7	257
	Silt, olive-gray, calcareous, contains very fine sand-----	11	268
	Sand, very coarse, and gravel, granular, pre- dominantly limestone, shale and lignite-----	9	277
	Rock, and clay, olive-gray (bouldery till?)-----	31	308
	Gravel, coarse sand to boulders, subangular-----	64	372
	Lignite-----	4	376
	Gravel, coarse sand to boulders, subangular-----	21	397
	Till (?) dark-greenish-gray (very poor samples)-----	11	408
	Gravel (very poor samples)-----	10	418
	Clay, sandy, brownish-black and olive-gray, very calcareous, lignitic (poor samples)-----	31	449
	Gravel, coarse sand to boulders, abundant dark brownish chips and a few "scoria fragments"-----	47	496
	Till, olive-gray; some pieces appear to be bed- rock (probably Tongue River sediments in- cluded in the till)-----	55	551
	Gravel, (can't distinguish new cutting)-----	5	556
	Silt, brownish-black and olive-gray, some fine sand, calcareous-----	4	560
Tongue River Formation:			
	Lignite-----	10	570
	Silt and sandy silt, light to medium light-gray, very slightly calcareous, some mica flakes and lignite-----	20	590

160-99-8ccc
Test hole 1524-ND

Glacial drift:.			
	Soil, black-----	1	1
	Till, brownish-yellow to dark-yellowish-orange, oxidized-----	10	11
	Sand, fine to coarse-----	5	16
	Sand, fine to medium-----	26	42
	Sand, fine to medium, contains lignite fragments and shale pebbles-----	11	53
	Till, gray-----	26	79
	Clay, sandy, gray, contains lignite fragments-----	9	88
	Gravel, clayey, fine sand to coarse pebbles, un- sorted-----	18	106
	Till, gray-----	20	126

160-99-29bbb
Test hole 1523-ND

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Soil, brown-----	2	2
	Till, brownish-yellow to dark-yellowish-orange, mottled, oxidized-----	31	33
	Till, gray-----	42	75
	Gravel, fine sand to medium pebbles-----	8	83
	Till, gray-----	15	98
	Gravel, or several small rocks (drilling action)-	5	103
	Clay, light-gray-----	86	189
	Till, gray-----	205	394
	Clay, sandy, gray to light brown-----	21	415
	Clay, carbonaceous, lignitic, contains some coarse sand grains-----	5	420

160-101-3aaa
Test hole 3030

	Fill-----	3	3
Glacial drift:	Sand, fine; and some dusky-yellow, oxidized silt-	7	10
	Gravel, sandy, fine to coarse; predominantly com- posed of shale limestone, lignite and quartz--	20	30
	Clay, silty, dusky-yellow, very calcareous, co- hesive, oxidized-----	13	43
	Till, silty to sandy, dusky-yellow to moderate- olive-brown, partly oxidized-----	17	60
	Till, silty to sandy, light-olive-gray-----	62	122
Tongue River Formation:	Sand, very fine, and light-olive-gray, clayey silt, very calcareous, moderately to tightly consolidated-----	27	149
	Sand, very fine and light-olive-gray, calcareous; clayey, silt; with thin interbedded sandstone lenses-----	7	156
	Shale, light-gray-----	6	162
	Silt, clayey, light-gray, very calcareous-----	8	170

160-101-11baa
Frank Eberle

(Log furnished by Marinus Jensen)

Glacial drift:	Clay, brown-----	30	30
	Sand, yellow-----	8	38
	Shale, soft-----	18	56
	Sand, fine-----	35	91

160-102-3bab
Test hole 3028

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Soil-----	2	2
	Till, dark-yellowish-orange to yellowish-brown, oxidized-----	26	28
	Till, silty, dark-greenish-gray-----	14	42
	Till, olive-gray-----	62	104
	Gravel, coarse sand to large pebbles, subrounded-----	4	108
	Till, olive-gray-----	28	136
	Till, olive-gray and dark-yellowish-orange; partly oxidized-----	18	154
	Gravel, coarse sand to large pebbles, subrounded, contains some lignite and pyrite-----	2	156
	Till, olive-gray-----	133	289
	Gravel, medium sand to medium pebbles; minor con- stituents include ironstone concretions and a few wood fragments-----	3	292
	Silt, greenish-gray, calcareous-----	18	310
	Shale and silt, dark-greenish-gray-----	44	354
	Sand, fine to very fine-----	9	363
	Silt and sand, fine-----	8	371
	Gravel, many brown pebbles-----	12	383
Tongue River Formation:			
	Silt, sandy to clayey, greenish-gray to light greenish-gray, very calcareous, lignitic-----	17	400

160-102-6abb
Test hole 3027

Glacial drift:			
	Soil-----	4	4
	Till, moderate to dark-yellowish-brown, oxidized-----	16	20
	Clay, silty, dark-yellowish-orange to moderate- yellowish-brown, calcareous, oxidized-----	7	27
	Till, silty, dark-greenish-gray-----	75	102
	Silt, dark-greenish-gray to olive-gray, calcareous, contains some sand-----	68	170
	Till, dark-greenish-gray-----	30	200
	Clay, silty, olive-gray to dark-greenish-gray, calcareous, and lignitic; some clay is shaley and some of which has black spots; appears to be from a swamp deposit-----	53	253
	Silt, sandy, olive-gray-----	18	271
	Clay, silty, olive-gray to dark-greenish-gray, some with black spots, calcareous, lignitic; is shaley-----	73	344
	Gravel-----	1	345
	Clay and silt, olive-gray to dark-greenish-gray-----	9	354
	Gravel, brownish-pebbles and chips-----	4	358
Tongue River Formation:			
	Clay, silty, light-gray to light-olive-gray, cal- careous; sandy silt in lower part-----	22	380
	Lignite-----	5	385

160-102-18ccc
Test hole 3005

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Gravel, very sandy, subrounded to well-rounded, oxidized-----	6	6
	Till, moderate-yellowish-brown, oxidized-----	8	14
	Till, moderate-olive-brown, partly oxidized-----	7	21
	Till, dark-greenish-gray, bottom few feet very sandy-----	12	33
	Gravel, sandy, medium sand to pebbles, subrounded, abundant limestone pebbles-----	11	44
	Silt and clay, olive-gray, calcareous-----	14	58
	Sand, fine to very fine, silt, olive-gray and clay olive-gray, probably interbedded-----	22	80
	Boulders, predominantly granite and sandstone-----	3	83
	Silt, olive-gray, calcareous-----	3	86
	Till, dark-greenish-gray, some sandy silt-----	14	100
	Sand, silty, fine to very fine-----	8	108
	Silt, olive-gray, with some black organic(?) spots-----	4	112
	Sand, fine to very fine, contains some gravel-----	8	120
	Clay (Till?) dark-greenish-gray, silty and sandy, very calcareous-----	25	145
	Till, dark-greenish-gray-----	40	185
	Silt, clayey, olive-gray to dark-greenish-gray, very calcareous; some black spots of clay-----	13	198
	Sand, gravelly, very fine to pebbles unsorted, dirty-----	1	199
	Silt, olive-gray to medium bluish-gray with black areas, calcareous-----	39	238
	Gravel, rounded, predominantly silicates, much brown staining and oxidation-----	22	260
Tongue River Formation:			
	Sand, very clayey, light-gray, very calcareous, slightly cohesive-----	40	300

160-102-26aaa
Test hole 2249

Glacial drift:			
	Soil, silty, black-----	1	1
	Till, silty to sandy, dusky yellow to moderate olive brown, partially oxidized-----	16	17
	Till, olive gray, contains a few thin gravel lenses-----	42	59
	Till, moderate olive brown-----	15	74
Tongue River Formation:			
	Clay, variegated light gray, light olive gray, light greenish gray, and olive gray, contains lignite streaks-----	62	136

160-103-2bbb
Test hole 3026

Glacial drift:			
	Till, medium to dark-yellowish-brown-----	35	35
	Till, dark-greenish-gray-----	27	62
	Gravel, fine sand to very large pebbles-----	10	72
	Clay, sandy, dark-greenish-gray-----	10	82
	Sand, fine sand to medium pebbles, subangular to rounded; abundant lignite and shale pebbles-----	40	122
	Till, dark-greenish-gray-----	12	134

160-103-2bbb--Continued
Test hole 3026

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift--Continued:			
	Till, silty, dark-greenish-gray-----	6	140
	Silt, olive-gray and dark-greenish-gray with black areas, calcareous; contains clay and very fine sand-----	16	156
	Till, dark-greenish-gray-----	7	163
	Silt, clayey, olive-gray and dark-greenish-gray with black areas, calcareous-----	26	189
	Till, dark-olive-gray-----	44	233
	Silt, clayey, olive-gray and dark-greenish-gray with black areas, calcareous-----	19	252
	Silt, sandy, olive-gray, calcareous; contains lignite-----	121	373
	Gravel, granular, angular to well-rounded-----	8	381
	Silt, clayey, olive-gray and dark-greenish-gray, calcareous-----	9	390
	Gravel, granular, abundant brownish-stained and weathered pebbles-----	3	393
Tongue River Formation:			
	Sandstone, light-gray, very fine to fine, cal- careous-----	12	405

160-103-5aaa
Test hole 3025

Glacial drift:			
	Soil, sandy-----	1	1
	Till, moderate to dark-yellowish-brown, oxidized-----	47	48
	Till, dusky-yellowish-brown, oxidized-----	2	50
	Till, olive-gray-----	3	53
	Till, dark-greenish-gray-----	21	74
	Sand, clayey and gravelly, very fine to medium pebbles; contains olive-gray silty clay lenses-----	16	90
	Sand, gravelly, very fine sand to medium pebbles-----	10	100
	Clay, silty, olive-gray; with lenses of fine silty sand-----	25	125
	Clay, and silty clay, dark-greenish-gray, hard; clays are calcareous-----	10	135
	Till, dark-greenish-gray-----	25	160
	Silt, greenish-gray, calcareous, some lignite fragments-----	12	172
	Clay, silty dark-greenish-gray, calcareous-----	5	177
	Gravel, medium sand to large pebbles; abundant well-rounded brownish, siliceous pebbles-----	6	183
Tongue River Formation:			
	Silt, clayey to sandy, variegated, dusky yellow, grayish-green, light-olive-gray, calcareous to noncalcareous; contains lignitic lenses-----	17	200

160-103-16bbb
Test hole 3082

Glacial drift:			
	Till, moderate-yellowish-brown grading downward into dark to dusky-yellowish-brown, oxidized-----	30	30
	Till, olive-gray-----	30	60
	Sand, medium, lignitic-----	36	96
	Gravel, medium sand to large pebbles, rounded, many pebbles are brown-----	4	100
	Silt, olive-gray, calcareous-----	26	126

160-103-16bbb--Continued
Test hole 3082

<u>Formation</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Glacial drift--Continued:			
	Till, olive-gray-----	62	188
	Gravel, medium sand to medium pebbles, well-round- ed; predominantly brownish pebbles-----	22	210
	Silt, olive-gray, calcareous, lignitic, cohesive- -----	14	224
	Gravel, medium sand to medium pebbles, well-round- ed, predominantly brownish pebbles-----	25	249
Tongue River Formation:			
	Lignite, greenish-gray sandy clay, brownish-black lignitic silt and greenish-gray, silty clay, interbedded-----	16	265
	Lignite, black-----	5	270

160-103-20dcd
Test hole 3081

Glacial drift:			
	Gravel, fine sand to large pebbles, unsorted, sub- rounded-----	8	8
	Till, moderate-yellowish-brown, oxidized-----	30	38
	Till, dusky-yellowish-brown, oxidized-----	12	50
	Sand, very fine to coarse, subangular to sub- rounded; contains clay lenses-----	34	84
	Silt, sandy, olive-gray, calcareous; gradational contacts, top and bottom-----	24	108
	Sand, silty, very fine to medium, subangular-----	24	132
	Sand, gravelly, very fine sand to small pebbles-- -----	4	136
	Till, light-olive-gray to olive-gray-----	16	152
	Gravel, coarse sand to large pebbles; abundant brownish and reddish, oxidized limestone gran- ite and silicious pebbles; limestone pebbles are subrounded other well rounded-----	10	162
Tongue River Formation:			
	Sand, silty, greenish-gray, calcareous, lignitic, bedded-----	13	175
	Lignite-----	10	185

161-95-33ddd
Test hole 3039

Glacial drift:			
	Clay, sandy and silty, yellowish-gray-----	5	5
	Till, light-olive-gray, oxidized-----	29	34
	Silt, dusky-yellow, calcareous, oxidized; contains lignite fragments-----	18	52
	Till, olive-gray-----	166	218
	Gravel, sandy, fine to coarse pebbles, moderately sorted, subangular to subrounded-----	17	235
	Till, silty and sandy, light-olive-gray, partly oxidized; appears to be mostly reworked Tongue River sediments-----	15	250
	Till, silty and sand, olive-gray; contains num- erous boulders-----	26	276
	Till, silty and sandy, olive-gray-----	35	311
Tongue River Formation:			
	Clay, grayish-yellow, calcareous; contains some indurated limestone layers-----	9	320

161-96-23bbc₁
Engvald Christianson

(Log furnished by Marinus Jensen)

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
	Clay, yellow-----	40	40
	Clay and rocks-----	4	44
	Clay, blue-----	64	108
	Gravel and rocks-----	12	120
	Clay, sandy, blue-----	63	183
	Sand and clay-----	3	186
	Shale, soft-----	4	190
	Gravel, coarse-----	5	195

161-96-32ccc
Test hole 3037

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Loam, silty, dark-brown-----	1	1
	Clay, silty, yellowish-gray to dusky-brown, oxidized-----	4	5
	Till, dusky-yellow to moderate-brown, oxidized-----	20	25
	Till, olive-gray-----	13	38
	Gravel and sand, fine sand to medium pebbles (average size 5 to 7 mm) subangular to sub-rounded-----	9	47
	Till (?) very sandy, olive-gray-----	11	58
	Till, olive-gray-----	131	189
	Gravel-----	8	197
	Till, olive-gray-----	63	260
	Till, oxidized-----	10	270
	Till? (drilling action and Electric log)-----	30	300
	Till, very silty, dusky-yellow to moderate olive-brown-----	42	342
	Sand, very fine, clayey, light-olive-gray, calcareous, lignitic-----	22	364
Tongue River Formation:	Limestone, olive-gray, indurated-----	2	366
	Clay, light-gray, very calcareous-----	11	377
	Clay, sandy, dusky-yellow to light-olive-gray, calcareous-----	3	380

161-96-35ddd
Test hole 3038

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Soil-----	1	1
	Till, silty and sandy, yellowish-gray to moderate-olive-brown, oxidized-----	9	10
	Till, moderate-olive-brown to light-olive-gray, partly oxidized-----	40	50
	Till, olive-gray-----	144	194
	Gravel, fine to very coarse, unsorted, generally subangular-----	29	223
	Till, olive-gray-----	9	232
	Silt, and very fine sand, olive-gray-----	21	253
	Gravel and sand, fine sand to medium pebbles, unsorted-----	9	262
	Till, olive-gray-----	50	312
Tongue River Formation:	Lignite, black-----	9	321
	Sand, fine to very fine, light-gray, calcareous-----	9	330

161-97-32ccc
Test hole 303h

<u>Formation</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Glacial drift:			
	Soil-----	2	2
	Till, silty, yellowish-gray, oxidized-----	8	10
	Till, silty, moderate-olive-brown to olive-gray, partly oxidized-----	20	30
	Till, silty, olive-brown-----	103	133
	Silt and clayey sand, olive-gray-----	17	150
	Clay, olive-gray to olive-black, plastic, tough--	15	165
	Till, olive-gray-----	25	190
	Clay, olive-gray to olive-black-----	15	205
	Till, olive-gray, few thin gravel lenses-----	108	313
	Till, partly oxidized-----	7	320
	Clay, sandy, light-gray, calcareous; olive-gray shale; moderate-olive-brown sandy clay; and indurated moderate olive-brown sandstone-----	20	340
	Clay, sandy, light-olive-gray clayey silt-----	33	373
	Gravel, coarse sand to large pebbles, moderately sorted, subrounded; predominantly limestone pebbles-----	23	396
Tongue River Formation:			
	Sandstone, light-greenish-gray, indurated-----	3	399
	Clay, light-gray, calcareous-----	21	420

161-98-9ccb
Test hole 1528-ND

Glacial drift:			
	Soil, brown-----	2	2
	Till, sandy, light-yellow to yellowish-orange, mottled, oxidized-----	14	16
	Till, gray-----	248	264
	Clay, silty, dark-gray-----	26	290
	Till, gray-----	68	358
Tongue River Formation:			
	Clay, sandy gray-----	20	378

161-98-11ccc
Test hole-MB

Glacial drift:			
	Soil, clay, yellow, with some gravel-----	13	13
	Clay, sandy, brown, with some gravel-----	24	37
	Clay, sandy, gray-----	68	105
	Gravel-----	2	107
	Clay, gray, with some gravel-----	15	122
	Gravel-----	8	130
	Clay, sandy, gray-----	4	134
	Gravel-----	2	136
	Clay, sandy, gray, with strips of gravel-----	14	150
	Clay, sandy, gray, with gravel, limestone and lignite fragments-----	232	382
	Clay, gray-----	41	423
	Clay, sandy, gray, with gravel, limestone frag- ments-----	50	473
Fort Union formation:			
	Clay, sandy, gray, with lignite fragments-----	6	479
	Sand, fine, gray with shale and lignite-----	21	500
	Hole filled-----		

161-98-14ddc
Test hole 1526-ND

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Soil, black-----	2	2
	Clay, sandy, yellow, oxidized, contains some fine to coarse sand-----	14	16
	Till, gray; till contains more gravel and lignite below 350 feet-----	477	493

161-98-15bbc
Test hole 1527-ND

Glacial drift:			
	Soil, black-----	2	2
	Clay, yellow, and fine gravel-----	14	16
	Till, gray, limestone boulder 128 to 132 feet----	121	137
	Sand, and clay lenses, (electric log) sample is sandy, till with some gravel-----	25	162
	Till, gray; ended in granitic boulder at 320 feet	158	320

161-98-27bbb
Test hole MB

Glacial drift:			
	Soil-----	1	1
	Clay, yellow, with gravel-----	11	12
	Clay, sandy, blue with gravel-----	18	30
	Sand, fine-----	2	32
	Clay, sandy, blue-----	3	35
	Sand, fine-----	2	37
	Clay, sandy, blue, with strips of fine sand-----	11	48
	Gravel, coarse and fine sand-----	4	52
	Clay, sandy, blue, with strips of fine sand-----	7	59
	Iron pyrite-----	1	60
Fort Union Formation (not reached)	Hole filled-----		

161-98-28aaa
Test hole 3088

Glacial drift:			
	Till, dark-yellowish-orange, oxidized-----	8	8
	Till, olive-gray-----	28	36
	Sand, medium to very coarse, angular to well- rounded; predominantly limestone, some shale, granite, lignite, and pyrite-----	3	39
	Silt, clayey to sandy, olive-gray, very cal- careous-----	196	235
	(Sidewall core at 200 feet) Silt, olive-gray, calcareous, soft, spongy; contains some clay and fine sand grains-----		
	Till, very silty, olive-gray, very calcareous----	110	345
	Gravel, medium sand to small pebbles, subrounded predominantly quartz and siliceous pebbles, some limestone, shale, granite and lignite----	12	357
Tongue River Formation:			
	Silt (?) no samples-----	25	382
	Lignite-----	4	386
	Sand, very fine and silty, greenish-gray, micace- ous, calcareous, and locally very lignitic----	29	415

161-98-34dcd
Test hole 3035

<u>Formation</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Glacial drift:			
	Soil-----	2	2
	Till, light-olive-gray, partially oxidized-----	18	20
	Silt and very fine clayey sand, dusky-yellow, moderate-olive-brown, and light-gray, calcare- ous, oxidized-----	10	30
	Till, silty, olive-gray-----	50	80
	Clay and silt, olive-gray, thinly laminated-----	3	83
	Gravel, fine to coarse, generally subrounded, pre- dominantly limestone pebbles-----	17	100
	Sand, fine to coarse with few pebbles, lignitic; contains thin clayey sand lenses-----	25	125
	Gravel, very coarse, generally subrounded-----	7	132
	Sand, clayey, fine to very coarse, unsorted; con- tains several silt lenses-----	13	145
	Sand, coarse and fine gravel; apparently contains some cobbles or small boulders (drilling action)-----	11	156
	Till, olive-gray-----	36	192
	Silt, light-olive-gray to olive-gray, partly oxidized-----	9	201
	Gravel, medium sand to coarse pebbles, unsorted, generally subrounded; individual grains or pebbles are generally brown, green or brownish- red; probably a silt or sand lens from 213 to 221 feet-----	28	229
Tongue River Formation:			
	Shale, light-olive-gray; some beds are carbon- aceous and lignitic-----	11	240

161-99-31ccc
Test hole 3032

Glacial drift:			
	Soil-----	3	3
	Till, sandy, moderate-olive-brown to light-olive- gray, partially oxidized; less sand below 10 feet-----	32	35
	Till, olive-gray-----	40	75
	Gravel, fine to medium moderately sorted, sub- angular to subrounded-----	35	110
	Gravel and sand, poorly sorted-----	10	120
	Silt, olive-gray, calcareous, contains lignite layers-----	54	174
	Till, silty, olive-gray-----	16	190
	Silt, very clayey, olive-gray, calcareous, lamin- ated with light-gray streaks-----	16	206
	Till, olive-gray-----	54	260
	Gravel, fine to very coarse-----	7	267
Tongue River Formation:			
	Shale, light to medium light-gray, very calcar- eous-----	13	280

161-99-33add
Test hole 3033

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Soil-----	1	1
	Till, very sandy, moderate-olive-brown, oxidized-----	9	10
	Gravel, clayey, angular to subrounded, highly oxidized-----	5	15
	Till, olive-gray-----	15	30
	Till, moderate-olive-brown, oxidized-----	8	38
	Till, gravelly and sandy; contains some lignite; electric log indicates sand and gravel-----	7	45
	Till and silt, sandy and lignitic olive-gray; possibly a lacustrine deposit-----	117	162
	Till, olive-gray-----	28	190
	Silt, olive-gray, calcareous, fairly cohesive-----	30	220
	Sand, fine, silty and clayey, olive-gray, calcareous, lignitic-----	22	242
	Clay, silty and sandy; calcareous contains much lignite and few small pieces of wood; silt and sand possibly in lenses-----	68	310
	Lignite, fissile angular-----	25	335
	Sand, clayey, very fine, moderately calcareous, slightly plastic; contains much lignite-----	15	350
	Sand, very fine, silty and lignite, light-olive-gray, calcareous, micaceous-----	22	372
	Till, silty to sandy-----	56	428
	Silt, sandy and clayey, olive gray, moderately calcareous, plastic and cohesive-----	12	440
Tongue River Formation:			
	Sandstone, light-greenish-gray, indurated, calcareous cement-----	10	450

161-99-34add
Test hole 1525-ND

Glacial drift:			
	Soil, sandy, brown-----	2	2
	Clay, sandy, brownish-yellow to yellowish-orange, mottled, oxidized-----	13	15
	Till, sandy, light-gray to yellowish-orange, mottled oxidized-----	16	31
	Till, light-gray-----	21	52
	Gravel, fine sand to large pebbles-----	7	59
	Till, gray-----	46	105
	Till, light-gray-----	102	207
	Sand, coarse and fine gravel with interstitial clay-----	12	219
	Till, light-gray, coarse sand and gravel, apparently interbedded-----	32	251
	Till, gray-----	32	283

161-100-33ddd
Test hole 3031

<u>Formation</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Glacial drift:	Soil-----	1	1
	Till, sandy, moderate-olive-brown to light-olive-gray, oxidized-----	39	40
	Till, moderate-olive-brown to light-olive gray, partly oxidized-----	18	58
	Till, olive-gray, several boulders-----	19	77
	Gravel, fine to coarse, poorly sorted, subangular to subrounded; limestone pebbles are highly oxidized-----	5	82
	Till, olive-gray, cohesive-----	27	109
	Gravel, fine to coarse, poorly sorted, subangular to subrounded-----	11	120
Tongus River Formation:	Shale, medium-gray, moderately soft, and light gray, slightly fissile fine sand, probably interbedded-----	20	140

161-101-2cbc
Test hole 3090

Glacial drift:	Till, dark-yellowish-brown, oxidized-----	20	20
	Till, olive-gray-----	40	60
	Silt, sandy, olive-gray, lignitic fragments, very calcareous, cohesive-----	50	110
	Sand, very fine to fine-----	9	119
	Silt, olive-gray, lignitic, very calcareous-----	11	130
	Sand, very fine, and silt, olive-gray, lignitic, calcareous-----	37	167
	Sand, no sample-----	11	178
	Silt, olive-gray, lignitic, very calcareous-----	8	186
	Sand, no sample-----	4	190
	Silt, sandy, olive-gray, lignitic, very calcareous-----	34	224
	Till, olive-gray-----	20	244
	Silt and gravelly sand, very fine sand to small pebbles, apparently interbedded-----	14	258
	Till, very silty, olive-gray and grayish-olive; with few thin sand lenses-----	57	315
Tongus River Formation:	Silt, greenish-gray, greenish-gray clay, light-olive-brown sandy clay, and olive-gray, fine sand-----	15	330
	Lignite, dusky-brown to black-----	15	345
	Silt, sandy, olive-gray to light olive-gray, lignitic, very calcareous, cohesive-----	10	355

161-101-33cdd
Test hole 3029

Glacial drift:	Soil-----	1	1
	Clay, silty and sandy, light-gray, very calcareous-----	2	3
	Clay, silty, light-olive-gray, partly oxidized, cohesive-----	17	20
	Clay, silty, olive-gray-----	10	30
	Till, olive-gray-----	20	50
	Till, dusky-yellow to moderate olive-brown, oxidized-----	10	60

161-101-33cdd--Continued
Test hole 3029

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift--Continued:			
	Till, moderate olive-brown to light-olive gray, partly oxidized contains much shale (Tongue River) below 70 feet-----	32	92
Tongue River Formation:			
	Shale, dusky-yellow to light-olive-gray, oxidized to partly oxidized, contains some very fine to fine calcareous sand-----	8	100

161-101-35add
Test hole 3004

Glacial drift:			
	Gravel and sand, medium sand to cobbles sub-rounded to rounded-----	10	10
	Till, dark-greenish-gray, some oxidation between 30 and 35 feet-----	43	53
	Silt, dark-greenish-gray with some black, some fine sand, very calcareous, few rootlets (possibly a swamp deposit)-----	27	80
	Gravel, unsorted-----	1	81
	Sandstone, light-olive to light-olive-brown, very fine to medium, oxidized, cemented-----	2	83
	Till, dark-greenish-gray-----	9	92
Tongue River Formation:			
	Clay, sandy, grayish-green, slightly indurated---	8	100

161-102-9d3d
Test hole 2248

Glacial drift:			
	Soil, gravelly, black-----	1	1
	Gravel, fine to medium, moderately sorted, sub-angular to subrounded, oxidized-----	4	5
	Clay, silty, yellowish-brown, oxidized-----	31	36
	Clay, silty, olive gray; some of the larger cuttings appear to be bedded-----	304	340
	Clay, silty, olive gray and dark olive gray, shale clay (apparently interbedded)-----	141	481
	Gravel, (drill action)-----	5	486
	Clay, silty, olive gray and dark olive gray-----	51	537
	Samples from below 340 feet are very poor-----		
	Till, olive gray (with purple tinge), very hard-----		Sidewall core 500
	Clay, sandy, olive gray, calcareous (till?) (side-wall core barrel tripped between 515 and 530 feet. Exact depth not determined)-----		
	Tongue River Formation (from drill action)-----		537
	Sand, very fine, clayey, light olive gray to light greenish gray, calcareous, friable-----	30	567

161-102-19cbb
Test hole 3006

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Sand, gravelly to clayey, some dark-yellowish-orange till-----	5	5
	Sand, gravelly, subrounded, many shale pebbles in lower eight feet-----	28	33
	Till, dark-greenish-gray-----	37	70
	Silt, dark-greenish-gray, some very fine sand and hard clay, calcareous-----	25	95
	Clay, silty, olive and dark-greenish-gray, calcareous-----	21	116
	Boulder-----	1	117
	Till, dark-greenish-gray-----	49	166
	Silt, dark-greenish-gray, calcareous, cohesive, contains some lignite, organic matter and mica flakes-----	118	284
	Gravel, rounded, brownish-pebbles, lignite and "scoria"-----	5	289
	Silt, dark-greenish-gray, calcareous, slightly cohesive; contains lignite, very fine sand and few small pebbles-----	26	315
	Gravel, rounded; predominantly brownish quartzite and igneous pebbles, some pyritic cement-----	37	352
Tongue River Formation:			
	Clay, olive-gray and dark-greenish-gray, hard-----	18	370

161-102-27aaa
Test hole 3080

Glacial drift:			
	Till, moderate-yellow-brown, oxidized-----	4	4
	Silt, dark-yellowish-brown, calcareous, oxidized-----	21	25
	Till, dark-greenish-gray-----	19	44
	Silt, olive to light-olive-gray, laminated; contains some fine sand and clay; some laminations are calcareous-----	41	85
	Till, olive-gray-----	57	142
	Gravel, fine sand to medium pebbles, subangular to rounded-----	5	147
	Till, olive-gray-----	28	175
	Silt, clayey, olive-gray with black spots, calcareous, locally sandy, lignitic-----	237	412
	Sand, clayey, very fine, calcareous, lignitic-----	18	430
	Silt, clayey, olive-gray with black spots-----	20	450
	Sand, clayey, very fine to medium, calcareous, lignitic, micaceous, wood fibers-----	38	488
	Gravel, granule to boulders, predominantly well rounded brownish-stained and oxidized siliceous pebbles-----	17	505
Tongue River Formation:			
	Silt, sandy, greenish-gray and brownish-black, lignitic very poor sample-----	30	535

161-103-2cba
Lloyd Kittelson

(Log furnished by Marinus Jensen)

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
	Clay-----	3	3
	Sand and gravel-----	29	32

161-103-11ada
Burrett Raam

	Clay, brown-----	60	60
	Clay, blue-----	70	130
	Quicksand-----	30	160
	Clay, light brown-----	15	175
	Sand, fine, water-----	5	180
	Sandstone-----	2	182
	Sand, fine-----	3	185
	Clay, hard-----	5	190
	Sand and gravel, brown-----	10	200

161-103-13cdc2
Harold Madsen

(Log furnished by Marinus Jensen)

Glacial drift:			
	Sand-----	29	29
	Clay, blue-----	25	54
	Sand and gravel-----	16	70

162-95-2bbc
Vernon Bramdt

(Log furnished by Oscar Weber)

	Clay, mixed-----	23	23
	Clay, sandy blue-----	9	32
	Clay, blue-----	2.5	34.5
	Coal, seam-----	0.5	35
	Clay, sandy blue-----	5	40
	Clay-----	13	53
	Clay, sandy brown-----	3.5	56.5
	Clay and coal-----	2	58.5
	Clay, sandy brown-----	5.5	64
	Clay-----	4.5	68.5
	Clay, sandy blue-----	1	69.5
	Clay-----	1.5	71
	Clay, sandy blue and brown-----	14	85
	Sandy (almost sandstone)-----	15	100
	Clay, sandy, blue-----	5	105
	Sandy-----	16	121
	Sand, coarser and darker-----	2	123
	Sandstone, light-----	7	130

162-95-3daa₁
Baukol-Noonan Inc.

(Log furnished by Oscar Weber)

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
	Slack-----	4	4
	Clay-----	17	21
	Sandy-----	14	35
	Rock, hard-----	1	36
	Missing-----	1.5	37.5
	Rock, hard-----	4.5	42
	Sandstone, soft-----	17	59
	Clay-----	1	60

162-95-3daa₂
Baukol-Noonan Inc.

(Log furnished by Oscar Weber)

	Fill-----	1.5	1.5
	Sandstone, hard-----	3	4.5
	Clay, brown mixed-----	7.5	12
	Coal-----	6.5	18.5
	Clay-----	18.5	37
	Rock-----	0.5	37.5
	Clay, blue with streaks of sand-----	28.5	66
	Clay, brown-----	4	70
	Coal-----	0.5	70.5
	Clay, brown-----	4	74.5
	Coal-----	0.5	75
	Clay, brownish-----	10.5	85.5
	Clay, greenish-----	4.5	90
	Coal-----	0.5	90.5
	Clay-----	23.5	114
	Clay with a trace of sand-----	6	120
	Clay, sandy-----	6	126
	Sandy, soft (brown 132-134)-----	8	134

162-95-4ac
City of Noonan, No. 3

(Log furnished by Oscar Weber)

	Clay-----	70	70
	Clay, sandy-----	10	80
	Sand, soft-----	11	91
	Rock, hard-----	7	98
	Clay, with small streaks of coal-----	85	183
	Rocky-----	7	190
	Clay and sandy streaks, layers-----	59	249
	Clay-----	33	282
	Coal-----	2	284
	Sandstone, brown, soft-----	4	288
	Hard pan-----	4	292
	Clay-----	10	302
	Coal-----	1.5	303.5
	Clay, brown-----	4	307.5
	Clay, hard-----	4.5	312
	Coal-----	2.5	314.5
	Clay, chalky-----	17.5	332
	Clay, blue-----	2.5	334.5
	Coal-----	3	137.5

162-95-4ac--Continued
City of Noonan, No. 3

(Log furnished by Oscar Weber)

<u>Formation</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
	Clay, chalky-----	4.5	342
	Sandstone-----	3	345
	Sandy-----	2.5	347.5
	Coal-----	0.5	348
	Sandy-----	3	351
	Clay-----	2	353
	Missing-----	37	390

162-95-31cdc
E. Shirley

(Log furnished by Marinus Jensen)

	Clay, yellow-----	80	80
	Clay and sand-----	4	84
	Clay and gravel, seams-----	16	100
	Clay, blue with sand-----	20	120
	Sand and gravel-----	14	134
	Clay blue-----	19	153
	Sand and gravel-----	11	164
	Clay-----	8	172
	Gravel-----	14	186
	Clay, blue-----	24	210
	Gravel, cemented, with boulders-----	3	213
	Clay, blue-----	40	253
	Coal-----	4	257
	Clay, varied colored, green, white and blue-----	18	275
	Sandstone-----	1	276
	Clay-----	9	285

162-96-11aaa
Test hole-MB

Glacial drift:

	Soil-----	2	2
	Clay, brown, with some gravel-----	6	8
	Boulder, granite-----	1	9
	Clay, yellow, with some gravel-----	13	22
	Clay, sandy, gray, with strips of yellow sandy clay-----	13	35

Fort Union Formation:

	Clay, sandy, gray, with strips of fine sand-----	10	45
	Clay, sandy, gray, with some gravel-----	15	60
	Clay, sandy, gray, with narrow strips of lignite-----	15	75
	Clay, sandy, gray, with strips of fine sand-----	3	78
	Clay, sandy, gray-----	22	100
	Hole filled-----		

162-96-11cdc
Test hole 3021

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Till, moderate-yellowish-brown, oxidized-----	27	27
	Till, dark-yellowish-brown, partly oxidized-----	15	42
	Till, dark-greenish-gray-----	10	52
	Gravel, medium sand to large pebbles, subangular to well-rounded, poorly sorted-----	10	62
	Till, dark-greenish-gray-----	55	117
Tongus River Formation:			
	Shale, lignitic shale, and sandstone, medium- light-gray and greenish to bluish-gray; sand- stone is calcareous; contains a thin limestone lens-----	23	140

162-96-32bbb
Test hole 3022

Glacial drift:			
	Soil-----	3	3
	Till, moderate-yellowish-brown to dark-yellowish- brown, oxidized-----	42	45
	Till, dark-greenish-gray, (harder from 140 to 245 feet)-----	181	226
	Silt and clay, dark-greenish-gray and olive-gray, with black areas, calcareous; contains some fine to very fine sand-----	32	258
	Gravel, coarse sand to large pebbles, subrounded- Till, olive-gray-----	6	264
	Gravel, coarse sand, granules and chips from larger rocks; sand is predominantly rounded quartz, many chips are brownish and weathered- Till, light gray-----	13	277
	Gravel, coarse sand, granules and chips from larger rocks; sand is predominantly rounded quartz, many chips are brownish and weathered- Till, light gray-----	21	298
Tongus River Formation:			
	Shale, silty, light-gray to greenish-gray, some thin limestone and lignitic lenses-----	22	320

162-97-14ddd
Test hole 1532-ND

Glacial drift:			
	Soil, black-----	4	4
	Till, sandy, yellow to brownish-orange, mottled, oxidized-----	17	21
	Till, gray-----	74	95
	Clay, sandy, dark gray-----	35	130
	Till, gray-----	69	199
	Gravel, fine; contains many shale pebbles-----	2	201
	Till, gray-----	115	316
	Clay, silty, light gray-----	20	336
	Till, light gray-----	27	363
Tongus River Formation:			
	Clay, sandy, light gray-----	15	378

162-97-19ccc3
Test hole 1530-ND

<u>Formation</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Glacial drift:			
	Soil, brown-----	2	2
	Till, yellow to moderate brownish-orange mottled, oxidized-----	19	21
	Till, yellowish-gray, oxidized-----	31	52
	Till, gray-----	20	72
	Silt or fine sand (electric log)-----	8	80
	Gravel, fine to medium-----	2	82
	Silt or fine sand (electric log)-----	8	90
	Till, gray-----	14	104
	Gravel, fine to coarse, many shale and lignite pebbles-----	12	116
	Till, gray-----	19	135
	Gravel, fine to coarse; contains some gray clay--	16	151
	Till, gray-----	14	165
	Till, light gray; abundant gravel, lignite and shale pebbles-----	205	370
	Gravel, fine and coarse sand, clay binder, drills as if cemented-----	18	388
	Gravel and boulders, cemented-----	6	394

162-97-29abb
J. Alden Nordstog

(Log furnished by Marinus Jensen)

Clay, brown-----	45	45
Quicksand-----	31	76
Clay, blue-----	4	80
Quicksand-----	5	85
Clay, sandy-----	10	95
Sand, fine; some float coal-----	6	101

162-97-32bbb
Test hole 1529-ND

Glacial drift:			
	Soil, sand, dark-brown-----	2	2
	Till, sandy, yellowish-orange to light-gray, mot- tled, oxidized-----	28	30
	Till, clayey, yellow, mottled, oxidized-----	21	51
	Sand, light-gray, very fine, clayey; grains pre- dominantly lignite fragments-----	44	95
	Till, sandy, light-gray to brownish-gray, abun- dant lignite-----	199	294
Tongue River Formation:			
	Clay, sandy, light-gray, very calcareous-----	11	305

162-97-32dbd
T. E. Ebreck

(Log furnished by Marinus Jensen)

Clay, brown-----	33	33
Quicksand-----	7	40
Clay, blue-----	48	88
Sand-----	4	92

162-98-12ddd
Test hole MB

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Soil-----	3	3
	Clay, yellow-----	3	6
	Clay, sandy, brown-----	8	14
	Sand, fine-----	8	22
	Clay, sandy, brown, with some gravel-----	12	34
	Sandstone, hard-----	1	35
	Clay, sandy, gray-----	6	41
	Gravel-----	5	46
	Clay, sandy, gray, with some gravel-----	11	57
	Gravel, sand and gray clay-----	43	100
	Gravel-----	16	116
	Clay, sandy, gray, with some gravel-----	59	175
	Clay, gray, with some gravel and limestone and lignite fragments-----	65	240
	Clay, sandy, gray, with strips of sandstone and some gravel-----	15	255
Fort Union Formation:			
	Clay, sandy, gray, with strips of gray clay and gravel with lignite fragments-----	61	316
	"Rock"-----	1	317
	Clay, gray-----	7	324
	Rock, hard-----		324
	Flowing well, initial flow 2-3 gpm-----		
	Hole filled-----		

162-98-14daa
Erling Doland

(Log furnished by Weber Drilling Co.)

Topsoil-----	2	2
Clay, sandy, yellow-----	8	10
Clay, sandy, gray-----	6	16
Boulder-----	0.5	16.5
Clay, sandy, gray-----	5	21.5
Boulder-----	1	22.5
Clay, sandy, gray-----	3.5	26
Clay, sandy, with boulders and gravel-----	10	36
Clay, gravel like, gray-----	9	45
Boulder on sidewall-----	--	45
Clay, sandy, gray-----	60	105
Clay, gray, very soft, little sand-----	7	112
Clay, sandy, darker gray, harder-----	20	132
Clay, sandy and gravel-----	8	140
Clay, gray-----	5	145
Clay, sandy, and pebbles-----	7	152
Shale, blue gray, hard-----	16	168
Shale, brown-----	1	169
Sand, coarse-----	1	170
Sand, gray, fine-----	18	188

162-98-23aaa
Test hole 1531-ND

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Soil, sandy, brown-----	1	1
	Till, sandy, yellow to brownish orange mottled, oxidized-----	22	23
	Till, yellowish gray to light brown; contains fine to medium gravel, lignite fragments and shale pebbles-----	29	52
	Till, gray; contains fine to medium gravel, lignite fragments and shale pebbles-----	123	175
	Gravel (drilling no sample)-----	2	177
	Till, gray; contains fine to medium gravel, lignite fragments and shale pebbles-----	127	304

162-98-23ccc
Test hole-ME

Glacial drift:			
	Soil-----	1	1
	Clay, brown, with some gravel-----	24	25
	Clay, gray, with some gravel-----	14	39
	Sand, fine, and gravel with lignite fragments-----	11	50
	Boulder, limestone-----	1	51
Fort Union Formation:			
	Lignite-----	1	52
	Limestone-----	1	53
	Clay, sandy, gray, with strips of lignite-----	99	152
	Clay, sandy, gray-----	16	168
	Lignite-----	11	179
	Lignite and brown clay-----	3	182
	Clay, gray, with strips of lignite and fine sand and limestone-----	13	195
	Hole filled-----		

162-98-25ddd
Test hole 3089

Glacial drift:			
	Silt, moderate-yellowish-brown, calcareous, oxidized; contains some very fine sand-----	30	30
	Till, moderate-yellowish-brown, oxidized-----	32	62
	Till, olive-gray; gravelly from 49 to 56 feet-----	52	114
	Sand, very fine to coarse, few small pebbles, unsorted subangular, contains some clay and silt-----	16	130
	Till, silty and sandy, olive-gray-----	33	163
	Silt, slightly sandy, olive-gray, lignitic, very calcareous-----	67	230
	Till, sandy, olive-gray-----	10	240
	Gravel, granules and small pebbles, subrounded predominantly limestone, with some granite, quartz, shale, sandstone and lignite; drilled as though there is interstitial silt or clay-----	20	260
	Till, gravelly, olive-gray-----	15	275
	Till, olive-gray-----	136	411
	Silt, sandy, olive-gray, very calcareous, contains lignite fragments-----	43	454
Tongue River Formation:			
	Sand, clayey, greenish-gray, lignitic micaceous, non-calcareous to slightly calcareous, cohesive-----	4	458
	Sandstone, bluish white, very calcareous-----	3	461
	Sand, fine to medium, light-bluish-gray, locally very lignitic, non-calcareous to calcareous-----	14	475

162-100-11daa,
Dahl Brothers

(Log furnished by Marinus Jensen)

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
	Clay, brown-----	35	35
	Clay, blue-----	28	63
	Mud, sandy and rocks-----	4	67
	Clay, blue-----	56	123
	Quicksand-----	24	147
	Clay, blue-----	55	202
	Mud, black-----	2	204
	Clay, brown-----	151	355
	Blackjack (sticky, greasy feel, clayey material)-	3	358
	Clay, brown-----	12	370
	Shale-----	70	440
	Sand-----	12	452

162-100-35aaa
Test hole 3015

Glacial drift:	Till, dark-yellowish-orange to moderate-yellowish-brown, oxidized-----	43	43
	Gravel and sand, fine sand to medium pebbles, subrounded, oxidized-----	8	51
	Till, dark-greenish-gray-----	143	194
	Gravel-----	1	195
	Till, dark-greenish-gray; some lignite and a few shale pebbles-----	11	206
Tongue River Formation:	Shale, silty, dark-yellowish-orange, moderate-yellow and greenish-gray, slightly calcareous, abundant lignite-----	24	230
	Silt and sandstone, very fine bluish-gray-----	10	240
	Electric log indicates interbedding from 206 to 240 feet-----		

162-101-16ccc
Test hole 3078

Glacial drift:	Till, sandy, moderate-yellowish-brown, oxidized-	35	35
	Sand, medium to very coarse, subangular, oxidized-----	3	38
	Till (?) olive-gray-----	6	44
	Gravel-----	6	50
	Till (?) olive-gray-----	4	54
	Gravel, fine sand to large pebbles, well rounded; predominantly limestone and granite pebbles--	14	68
	Till, olive-gray-----	25	93
	Sand, fine to granule, rounded-----	15	108
	Till, olive-gray-----	52	160
	Gravel, fine sand to small pebbles, rounded-----	4	164
	Silt and clay, olive-gray to light-olive-gray, calcareous, lignite fragments-----	85	249
	Till, olive-gray-----	69	318
Tongue River Formation:	Silt and very fine sand, dark-greenish-gray to greenish-gray, lignitic-----	12	330
	Lignite-----	5	335

162-101-31aaa
Test hole 3079

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Till, moderate-yellowish-brown, oxidized-----	28	28
	Silt, dark-yellowish-brown, calcareous; some clay and very fine sand-----	9	37
	Silt, dark-greenish-gray, calcareous, cohesive; a small quantity of olive-gray till (depth un- known)-----	55	92
	Gravel, medium sand to large pebbles, rounded to subrounded, well sorted-----	34	126
	Silt, dark-greenish-gray, calcareous, cohesive---	166	292
	Gravel, granule, rounded to subrounded-----	18	310
	Silt, greenish-gray, calcareous, and granule gravel, interbedded; some olive-gray till----	24	334
	Silt, greenish-gray, calcareous-----	21	355
	Till, olive-gray to olive-black, lignitic-----	41	396
Tongue River Formation:			
	Sandstone, very fine to medium cohesive clay, and a few oxidized lignitic beds, probably inter- bedded; (calcareous cemented zone 414-415 feet)-----	49	445

162-102-7ccc
Test hole 2247

	Loam, gravelly, dark brown-----	1	1
	Gravel, fine to medium, very sandy, subangular to subrounded, moderately sorted; pebbles princi- pally granite limestone and shale-----	15	16
	Gravel, fine to coarse, generally subrounded, in- terval contains some clay lenses-----	28	44
	Clay, sandy and silty, dusky yellow to moderate olive brown, cohesive (till?)-----	19	63
	Till, sandy, olive gray, moderately plastic-----	15	78
	Gravel, fine to coarse, subangular to subrounded, poorly sorted-----	6	84
	Sand, coarse, some gravel, subrounded, moderately sorted-----	30	114
	Till, very silty, olive gray, slightly plastic; many pebbles and several small boulders-----	52	166
	Gravel, fine to coarse-----	2	168
Tongue River Formation:			
	Coal, black-----	4	172
	Clay, silty, light olive gray, very calcareous---	6	178
	Coal, black fissile-----	4	182
	Clay, silty, light gray, light olive gray, and light greenish gray, very calcareous; contains some carbonized woody fragments-----	7	189

162-102-20aba
Sodium Corp. of America

(Log furnished by Marinus Jensen)

Clay-----	12	12
Gravel and sand-----	17	29

162-102-23aaa
Test hole 3011

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Soil-----	3	3
	Till, olive-brown, oxidized, contains limestone, granite and shale granules-----	20	23
	Till, dark-greenish-gray; contains quartz, lime- stone granite and shale granules-----	13	36
	Gravel and sand, fine sand to large pebbles, sub- rounded to rounded, some clay or till-----	23	59
	Very poor samples above 80'		
	Till, dark-greenish-gray-----	83	142
	Gravel, granular, subrounded-----	1	143
	Clay, shaley, olive-gray, calcareous, cohesive, hard; contains gravel or sand lenses, also abundant lignite particles below 255 feet-----	205	348
	Gravel, chips, predominantly brown chips of quartz and quartzite with some limestone and mafic igneous chips-----	10	358
Tongue River Formation:			
	Sandstone, silty, light-olive-gray, very fine, some lignitic material-----	27	385

162-103-10dcb
Sven Bervik

(Log furnished by Marinus Jensen)

Gravel-----	83	83
Clay, blue, and sand-----	11	94
Clay, blue-----	44	138
Gravel-----	6	144

162-103-25bbb
Test hole 3007

Glacial drift:			
	Gravel and sand, medium sand to large pebbles, rounded, oxidized, abundant limestone and granitic pebbles-----	54	54
	Clay, sandy, oxidized-----	4	58
	Sand, clayey, very fine to very coarse (poor samples)-----	27	85
	Sand and gravel; pebbles predominantly shale and limestone-----	19	104
	Till, dark-greenish-gray-----	31	135
	Till, moderate-olive-brown, partly oxidized; a- bundant lignite particles, and limestone and shale grains-----	19	154
Tongue River Formation:			
	Clay, slightly silty, dusky-yellow-green and medium bluish gray, slightly oxidized, hard; also some interbedded, oxidized, very fine, silty sand-----	15	169
	Lignite-----	6	175
	Sand, silty to very fine, partly oxidized-----	5	180

163-95-15ddd
Testhole-MB

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Soil-----	2	2
	Clay, yellow-----	4	6
	Clay, brown, with some gravel-----	25	31
	Sand, coarse-----	1	32
	Clay, brown-----	2	34
	Boulder, granite-----	1	35
Fort Union Formation:			
	Clay, gray and brown with strips of lignite-----	8	43
	Clay, bluish gray with strips of lignite-----	18	61
	Clay, gray-----	27	88
	Sandstone-----	1	89
	Clay, gray-----	1	90
	Limestone or "siltstone", hard, fine grained-----	4	94
	Clay, gray-----	6	100
	Hole filled-----		

163-95-27bdb
Northwest Oil Co.

(Log furnished by Northwest Oil Co.-MB)

Glacial drift:			
	Clay, yellow-----	45	45
	Clay, blue-----	40	85
Bedrock:			
	Shale, green (Fort Union formation)-----	5	90
	Shale, blue-----	10	100
	Limestone, thin-bedded-----	10	110
	Sandstone; water-----	15	125
	Shale, blue to gray-----	40	165
	Limestone, thin-bedded-----	5	170
	Lignite-----	5	175
	Shale, brown-----	25	200
	Limestone, gray-----	20	220
	Shale, gray-----	60	280
	Shale, brown-----	25	305
	Lignite-----	10	315
	Shale, gray-----	5	320
	Shale, sandy, gray-----	50	370
	Sandstone; water-----	10	380
	Shale, black to gray-----	40	420
	Shale, with pebbles-----	5	425
	Lignite-----	8	433
	Shale, gray-----	17	450
	Shale, black to gray-----	90	540
	Shale, sandy, gray-----	50	590
	Shale, gray-----	20	610
	Shale, sandy, gray-----	85	695
	Sandstone; water and small amount of gas-----	20	715
	Shale, sandy, gray-----	35	750
	Shale, brown-----	30	780
	Shale, gray-----	125	905
	Shale, brown-----	65	970
	Shale, gray-----	40	1,010
	Shale, gray; small amount of gas-----	10	1,020
	Sandstone-----	15	1,035
	Shale, black-----	5	1,040
	Shale, sandy, gray-----	95	1,135
	Shale, black-----	15	1,150
	Sandstone; water and small amount of gas-----	55	1,205

163-95-27bdb--Continued
Northwest Oil Co.

(Log furnished by Northwest Oil Co.-MB)

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift--Continued:			
	Shale, blue (Pierre shale?)-----	95	1,300
	Shale, broken, black-----	30	1,330
	Shale, blue-----	370	1,700
	Shale, dark blue-----	65	1,765
	Limestone, thin-bedded-----	1	1,766
	Shale, dark gray-----	164	1,930
	Shale, black-----	33	1,963
	Limestone, thin-bedded-----	1	1,964
	Shale, dark gray-----	71	2,035
	Limestone, thin-bedded-----	1	2,036
	Shale, dark gray-----	75	2,111
	Limestone, thin-bedded-----	1	2,112
	Shale, dark gray-----	116	2,228
	Limestone, thin bedded-----	2	2,230
	Shale, dark gray-----	5	2,235

163-95-29ddd
Test hole-MB

Glacial drift:			
	Soil-----	2	2
	Clay, yellow-----	12	14
	Sand, fine-----	2	16
	Clay, blue-----	1	17
	Sand, fine with strips of yellow clay-----	2	19
Fort Union Formation:			
	Sandstone-----	4	23
	Sand, fine, gray-----	18	41
	Sand, compact white-----	3	44
	Clay, sandy, gray, with strips of compact gray sand-----	11	55
	Sand, compact, gray-----	12	67
	Lignite-----	1	68
	Clay, gray with strips of lignite and brown clay-----	4	72
	Clay, sandy, gray-----	4	76
	Clay, gray-----	18	94
	Lignite-----	2	96
	Clay, gray, with strips of brown and bluish clays Hole filled-----	34	130

163-96-1bcc
Test hole 3020

Glacial drift:			
	Soil-----	4	4
	Gravel, fine sand to large pebbles, rounded, oxidized-----	9	13
	Till, olive-gray and dark-greenish-gray, some oxidization near top-----	34	47
	Gravel, granular to sandy; contains abundant brownish granules (weathered), and some "scoria" fragments-----	1	48
Tongus River Formation:			
	Silt, medium-light-gray, very calcareous, contains some lignitic lenses-----	17	65
	Lignite-----	1	66
	Sandstone, silty, light-bluish-gray, very fine to fine-----	9	75

163-96-5aaa
Test hole-MB

<u>Formation</u>	<u>Material</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Glacial drift:			
	Soil-----	3	3
	Clay, gray-----	1	4
	Gravel-----	10	14
	Clay, silty, gray-----	31	45
Fort Union Formation:			
	Clay, sandy, blue, with fine sand-----	26	71
	Clay, gray, with lignite-----	4	75
	Clay, brown, tight, with strips of light gray clay, and lignite-----	7	82
	Clay, blue and gray-----	4	86
	Clay, gray, with some strips of lignite-----	10	96
	Lignite, with strips of gray clay-----	3	99
	Clay, gray-----	22	121
	Lignite, hard and soft in strips, some clay-----	12	133
	Clay, gray, with strips of lignite-----	24	157
	Lignite-----	2	159
	Clay, gray, tight, with strips of lignite-----	10	169
	Lignite, with some clay-----	12	181
	Clay, sandy, gray, with strips of lignite-----	8	189
	Sandstone, gray, hard-----	3	192
	Sand, gray, compact-----	8	200
	Hole filled-----		

163-96-15ddd
Test hole-MB

Glacial drift:			
	Soil-----	1	1
	Clay, brown-----	5	6
	Clay, brown, with gravel-----	10	16
	Clay, gray, with strips of brown clay, with some gravel-----	9	25
	Sand, coarse and fine gravel-----	26	51
	Gravel with boulders, some lignite fragments-----	4	55
Fort Union Formation:			
	Clay, sandy, gray and brown-----	36	91
	Clay, sandy, blue, with strips of lignite-----	10	101
	Lignite, with strips of clay-----	5	106
	Clay, sandy, blue and brown, with strips of lig- nite-----	31	137
	Sandstone, gray, hard-----	2	139
	Sand, fine with strips of gray sandy clay-----	5	144
	Sand, gray, compact-----	6	150
	Sand, fine, with strips of gray sandy clay-----	7	157
	Sand, gray, compact with some brown sandy clay-----	44	201
	Lignite, with strips of brown and gray sandy clay-----	16	217
	Sand, gray, compact with strips of lignite, some brown clay-----	29	246
	Lignite with compact gray sand some brown sandy clay-----	12	258
	Clay, sandy, gray, with some green, gray and brown clay-----	15	271
	Sand, gray, compact with strips of lignite-----	18	289
	Clay, sandy, brown (carbonaceous) with strips of lignite-----	7	296
	Clay, sandy, gray, and green, with strips of lignite-----	27	323
	Lignite, soft-----	2	325
	Clay, sandy, gray, with strips of green sandy clay and some lignite-----	20	345

163-96-15ddd--Continued
Test hole-MB

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Fort Union Formation--Continued:			
	Sandstone, thin strips, with dark gray and brown clay-----	5	350
	Sandstone, gray, hard-----	1	351
	Clay, sandy, gray with strips of lignite-----	69	420
	Clay, sandy, gray-----	5	425
	Clay, sandy, brownish gray, with strips of lignite-----	5	430
	Hole filled-----		

163-96-33ccc
Test hole 3023

Glacial drift:			
	Soil-----	2	2
	Till, dark-yellowish-orange, oxidized-----	9	11
	Till, dark-greenish-gray, abundant lignite particles-----	28	39
	Sand, fine to granule, abundant lignite particles-----	3	42
	Till, olive-gray, abundant lignite-----	21	63
	Silt, greenish-gray, calcareous; contains some mica and lignite-----	9	72
	Sand, gravelly, medium sand to medium pebbles; contains abundant brownish-weathered pebbles, subangular to rounded-----	8	80
	Silt, greenish-gray, calcareous-----	8	88
	Gravel, medium to large pebbles (drills as though small boulders are present) pebbles are predominantly brownish-weathered pebbles-----	14	102
Tongue River Formation:			
	Limestone, yellowish-gray, very hard-----	1	103
	Clay, very light-gray, to medium dark-gray, the very light-gray clay is very calcareous-----	17	120

163-96-29ddd
Test hole-MB

Glacial drift:			
	Soil-----	2	2
	Clay, yellow, with fragments of gypsum-----	11	13
	Clay, sandy, gray-----	4	17
	Boulder, limestone-----	1	18
	Gravel, with strips of yellow clay-----	7	25
	Clay, yellow, with strips of gravel-----	11	36
	Clay, sandy, gray with some gravel-----	26	62
	"Rock"-----	1	63
	Clay, sandy, gray with some gravel-----	17	80
	Gravel, fine and sand-----	11	91
	Clay, sandy, gray, with some gravel-----	17	108
	Boulder, limestone-----	1	109
	Clay, sandy, gray with some gravel-----	29	138
	Boulder, limestone-----	2	140
	Clay, sandy, gray with strips of limestone and gravel-----	64	204
	Sand, fine with some gray clay and lignite fragments-----	5	209
	Clay, sandy, gray with some gravel-----	30	239
	Boulder, limestone-----	2	241
	Clay, sandy, gray with some gravel and lignite fragments-----	25	266

163-96-29ddd--Continued
Test hole-M3

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Fort Union Formation:			
	Clay, gray with some gravel-----	13	279
	Lignite-----	2	281
	Clay, gray with strips of lignite-----	37	318
	Lignite, soft, with hard strips-----	11	329
	Clay, sandy, brown (carbonaceous) with strips of lignite-----	7	336
	Hole filled-----		

163-97-3adb1
Test hole 3024

Glacial drift:

	Gravel, fine sand to very large pebbles, unsorted subangular to well-rounded, oxidized; contains some grayish-orange silt from 6 to 9 feet-----	20	20
	Silt, olive-gray, calcareous-----	10	30
	Till, olive-gray-----	19	49
	Till, dark-yellowish-orange to moderate yellowish-brown, oxidized-----	29	78
	Till, dusky-yellowish-brown, partly oxidized-----	22	100
	Gravel, granular, subangular-----	2	102
	Till, dark to moderate-yellowish-brown, oxidized-----	40	142
	Silt, moderate-yellowish-brown, very calcareous, oxidized-----	7	149
	Gravel, granular, subangular, oxidized-----	9	158
	Till, dark-yellowish-brown; some oxidized-----	22	180
	Silt, moderate-yellowish-brown, calcareous, hard-----	10	190
	Till, moderate-yellowish-brown; contains gravel from 191 to 192 feet-----	28	218
	Till, dark-greenish-gray-----	77	295
	Sand and silt, olive-gray and black, lignitic, calcareous, laminated, sand is fine to very fine (poor samples)-----	70	365
	Clay (till?) slightly silty, dark-greenish-gray, very calcareous-----	29	394
	Gravel, granular to medium sand, subrounded-----	6	400
Fort Union Formation (contact somewhat questionable may be as deep as 420 feet):			
	Clay, greenish-gray, very calcareous; clay, silty; light-gray, very calcareous; clay, lignitic, brownish black, calcareous, and silt, light-olive-gray, very calcareous-----	20	420
	Sandstone, light-bluish-gray, calcareous; contains mica flakes-----	10	430

163-97-4daa
Test hole 3019

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Gravel and soil-----	2	2
	Till, dark-yellowish-orange, oxidized-----	4	6
	Gravel, fine sand to very large pebbles, angular to rounded, oxidized, abundant limestone and granite pebbles-----	8	14
	Till, dusky-yellowish-brown, partly oxidized-----	4	18
	Till, dark-greenish-gray, some lignite particles and biotite-----	34	52
	Till, silty, moderate-yellowish-brown and dark-greenish-gray partially oxidized-----	13	65
	Gravel, fine sand to small pebbles, angular, oxidized abundant, limestone-----	5	70
	Till, silty, dark-greenish-gray and moderate yellowish-brown partially oxidized, contains several small gravel lenses and boulders-----	75	145
	Till, silty, dark-greenish-gray, contains a few gravel lenses and boulders-----	31	176
	Gravel, medium sand to medium pebbles, subangular to rounded, principally limestone, shale and granitic pebbles-----	12	188
	Till, silty, dark-greenish-gray-----	8	196
	Silt, medium-gray, very calcareous; contains some very fine sand-----	8	204
	Gravel, medium sand to medium pebbles, subangular to rounded-----	6	210
Tongue River Formation:			
	Clay, sandy, greenish-gray; contains mica flakes and a few oxidized cuttings-----	7	217
	Clay, sandy, greenish-gray, micaceous, contains thin lenses of lignite, limestone, lignitic shale and lignitic silt-----	23	240

163-97-13cc
Test hole-MB

Glacial drift:			
	Soil-----	1	1
	Clay, sandy, gray-----	4	5
	Sand, fine and gravel-----	2	7
	Clay, yellow-----	3	10
	Clay, blue-----	23	33
	Clay, yellow and gray-----	12	45
	Rock (??), strips-----	1	46
	Clay, gray, with fine sand-----	15	61
	Clay, silty, gray-----	41	102
	Clay, gray, with some gravel and lignite fragments	138	240
	Clay, gray, with some gravel, lignite fragments and fine sand-----	55	295
	Clay, gray-----	89	384
	Sand, fine and gravel, with lignite fragments-----	13	397
	Gravel and fine sand-----	31	428
	Sand, fine and gravel with gray clay-----	20	448
	Boulders-----	9	457
	Clay, gray-----	2	459
Fort Union Formation: (not reached)			
	Flowing well, initial flow, 4-5 gpm-----		
	Hole filled-----		

163-97-26bbb
Test hole-MB

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Soil-----	4	4
	Clay, yellow, with some gravel-----	14	18
	Clay, sandy, gray, with some gravel-----	51	69
	Clay, sandy, yellow with some gravel-----	16	85
	Clay, sandy, brown, with some gravel and strips of limestone-----	48	133
	Boulder, limestone-----	1	134
	Clay, sandy, brown with some gravel-----	7	141
	Gravel, with fine sand-----	7	148
	Clay, sandy, brown with some gravel and strips of limestone-----	46	194
	Clay, sandy, blue with some gravel-----	36	230
	Gravel and fine sand, with lignite fragments-----	3	233
	Clay, sandy, gray, with some gravel, strips of limestone and lignite fragments-----	30	263
	Boulder, limestone-----	2	265
	Clay, sandy, gray, with some gravel, strips of limestone and lignite fragments-----	35	300
	Gravel with strips of limestone-----	6	306
	Clay, sandy, gray with some gravel-----	5	311
	Clay, sandy, gray with strips of limestone, gravel and lignite fragments-----	24	335
	Boulder, limestone-----	2	337
Fort Union Formation:			
	Clay, sandy, gray with lignite fragments-----	38	375
	Clay, sandy, gray with strips of sand-----	40	415
	Rock-----	1	416
	Clay, sandy, gray-----	14	430
	Sand, fine-----	8	438
	Flowing well, initial flow 3-4 gpm-----		
	Hole filled-----		

163-97-30abb
Test hole 3017

Glacial drift:			
	Gravel, fine sand to large pebbles, oxidized----	12	12
	Till, very silty, moderate-yellowish-oxidized---	1	13
	Till, very silty, dark-greenish-gray-----	11	24
	Sand, unsorted; contains some gravel and clay----	4	28
	Till, dark-greenish-gray; contains some shale and quartz pebbles; some oxidized till at 50 feet-	82	110
	Clay, dark-greenish-gray, silty to sandy-----	20	130
	Till, dark-greenish-gray-----	16	146
	Sand, very fine to medium-----	14	160
	Silt, olive-gray to olive-black, with black spots, calcareous, (has the appearance of a swamp deposit)-----	10	170
	Till, olive-gray, abundant gravel and boulders, very hard-----	30	200

163-97-33ccc
Test hole-MB

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Clay, sandy, yellow, with some gravel-----	13	13
	Clay, yellow, dark-----	11	24
	Clay, gray, sandy with some gravel-----	17	41
	Gravel-----	5	46
	Clay, gray-----	2	48
	Gravel-----	4	52
	Clay, sandy, gray-----	4	56
	Sand, with gray clay and strips of gravel and lignite fragments-----	8	64
	Gravel, fine, with lignite fragments-----	7	71
	Gravel, with boulders, strips of limestone and gray clay-----	5	76
	Clay, sandy, gray, with strips of gravel-----	8	84
	Clay, sandy, gray-----	81	165
	Gravel and strips of limestone-----	2	167
	Clay, sandy, gray, with some sand and/or gravel strips-----	159	326
	Clay, sandy, gray, with some strips of limestone-----	40	366
	Clay, sandy, gray, with some gravel and lignite fragments-----	62	428
	Gravel, with gray clay and lignite fragments-----	16	444
	Sandstone, hard-----	1	445
	Clay, sandy gray, with some gravel and lignite fragments-----	51	496
	Rock-----	1	497
	Clay, sandy, gray-----	24	521
Fort Union Formation: (not reached)			
	Hole filled-----		

163-97-34aac
City of Crosby, Well 1

(Log furnished by City Engineer)

Glacial drift:			
	Clay, yellow-----	22	22
	Sand-----	1	23
	Clay, yellow-----	11	34
	Clay, yellow, with gravel-----	20	54
	Clay, yellow, with stones-----	3	57
	Clay, yellow, with sand-----	42	99
	Clay, blue, with gravel-----	14	113
	Clay, hard, blue-----	35	148
	Shale, hard, gray-----	32	180
	Shale, blue, with stones-----	47	227
	Shale, blue, with boulders-----	21	248
	Shale, blue, with lignite-----	30	278
	Shale and sandstone-----	2	280
	Sandstone, soft; water-----	15	295
	Shale, blue-----	1	296

163-97-34ada
 City of Crosby, Well No. 2
 (Log furnished by Oscar Weber)

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
	Till (rock at 37 feet)-----	47	47
	Clay, yellow (rock at 57 feet)-----	10	57
	Till-----	20	77
	Clay, sandy-----	9	86
	Clay, blue-----	12	98
	Clay, green-----	4	102
	Clay, blue-----	4.5	106.5
	Clay and coal-----	4	110.5
	Clay, blue-----	13	123.5
	Clay and coal-----	3.5	127
	Clay, gray-----	5.5	132.5
	Sand, fine and clay-----	15.5	148
	Clay, blue-----	52	200
	Missing-----	85	285
	Gravel-----	5	290
	Clay (rock at 295)-----	29	319
	Sand, mucky-----	4	323
	Clay with streaks of sand-----	17	340
	Clay and sand-----	10	350
	Clay, sandy-----	10	360
	Sandy-----	7	367
	Clay, white with trace of sand-----	3	370
	Sand-----	2	372
	Sand, coarse Log incomplete by thickness of sand. (City engineer believes well is 390 feet deep.)-----	18	390

163-99-17aaa
 Test hole 3014

Glacial drift:			
	Fill-----	5	5
	Till, moderate-yellowish-brown to dark-yellowish brown, oxidized-----	26	31
	Till, dark-greenish-gray, some lignite particles-----	89	120
	Till, moderate-yellowish-brown, oxidized-----	2	122
	Till, dark-greenish-gray-----	32	154
	Gravel and sand, medium sand to medium pebbles, subrounded to rounded, poorly sorted-----	8	162
	Till, dark-greenish-gray-----	53	215
	Silt, sandy, dark-greenish-gray to olive-gray, calcareous; abundant lignite in upper part-----	98	313
	Gravel and clay, interbedded?-----	5	318
Tongue River Formation:			
	Lignite-----	4	322
	Sandstone, silty and clayey, bluish-gray, mica flakes, lignite, hard-----	9	331
	Lignite-----	4	335
	Shale-----	5	340

163-99-18aaa
Test hole 3013

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Till, dusky-yellow and dark-yellowish-brown, oxidized-----	45	45
	Till, dark-greenish-gray-----	47	92
	Gravel and sand, fine sand to large pebbles, subrounded to well-rounded-----	10	102
	Clay, (from drilling)-----	18	120

163-99-35bbb
Vassen Brothers

(Log furnished by Axel Palm)

	Clay, yellow, and rocks-----	50	50
	Clay, blue, and rocks-----	100	150
	Clay, gray, and rocks-----	42	192
	Clay, white-----	2	194
	Gravel, coarse-----	2	196

163-100-9aaa
Test hole 3077

Glacial drift:			
	Till, dark-yellowish-orange to dark-yellowish-brown, oxidized-----	45	45
	Till, olive-gray-----	40	85
	Sand, fine to very coarse, some small pebbles, subrounded-----	5	90
	Till, olive-gray-----	9	99
	Sand, very fine, some medium-----	4	103
	Till, olive-gray-----	4	107
	Sand, very fine to medium-----	35	142
	Till, sandy, olive-gray-----	13	155
	Till, olive-gray-----	115	270
	Silt, light-olive-gray, calcareous, lignitic; contains some very fine sand-----	65	335
	Till, olive-gray-----	111	446
Tongue River Formation:			
	Silt, sandy, olive-gray and greenish-gray, lignitic, slightly calcareous; contains some very fine sand and clay-----	29	475

163-100-13bbb
Test hole 3076

Glacial drift:			
	Till, sandy, moderate to dark-yellowish-brown, oxidized-----	45	45
	Till, olive-gray-----	28	73
	Gravel, coarse sand to medium pebbles, angular to rounded; predominantly granite and limestone, some quartz and shale and minor lignite and pyrite-----	7	80
	Till, olive-gray-----	60	140
	Gravel, coarse sand and small pebbles, subrounded to rounded; predominantly shale and limestone-----	5	145
	Sand, fine to very coarse, subrounded-----	10	155

163-100-13bbb--Continued
Test hole 3076

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift--Continued:			
	Till, olive-gray-----	25	180
	Gravel, medium sand to medium pebbles, subrounded; interbedded with olive-gray till or clay (about 40 percent)-----	32	212
	Till, olive-gray; interbedded thin gravel lenses-----	11	223
	Till, olive-gray-----	167	390
Tongue River Formation:			
	Sand, very silty, greenish-gray, micaceous, lig- nitic, locally calcareous; some greenish-gray clay-----	25	415

163-100-20bac
B. A. Simonson

(Log furnished by Marinus Jensen)

Clay, brown-----	42	42
Clay, blue-----	10	52
Sand-----	5	57
Clay, blue-----	33	90
Sand, fine-----	31	121
Clay-----	2	123
Sand, fine-----	2	125

163-100-20dbc
Frank Mosser

(Log furnished by Marinus Jensen)

Clay, brown-----	75	75
Quicksand-----	55	130
Clay, blue-----	57	187
Gravel and sand-----	1	188

163-100-31daa
Test hole 3012

Glacial drift:

Till, dark-yellowish-orange to grayish-olive, oxidized, less oxidized with depth; contains selenite crystals-----	44	44
Silt, moderate-olive-brown, calcareous-----	5	49
Till, dark-greenish-gray, some very silty areas--	149	198
Gravel and sand-----	8	206
Till, dark-greenish-gray; a few sand and gravel lenses; (several boulders encountered between 230 and 360 feet, very poor samples from this depth)-----	179	385
Gravel and sand, fine sand to medium pebbles, angular to rounded-----	45	430
Silt, sandy dark-greenish-gray-----	12	442
Gravel and sand, very coarse sand to fine gravel, subangular, contains a few scoria fragments---	16	458
Silt, sandy, dark-greenish-gray; contains some lignite-----	39	497
Tongue River Formation:		
Sandstone, clayey, dusky-yellow, oxidized-----	23	520

163-101-27dab
 Village of Fortuna, Test 1
 (Log furnished by Schnell Inc.)

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
	Clay, brown-----	14	14
	Gravel-----	1	15
	Clay, brown-----	25	40
	Clay, blue-----	200	240

163-101-35add
 C. R. Henderson

(Log furnished by Marinus Jensen)

	Clay, brown-----	52	52
	Sand and gravel-----	29	81

163-101-35cac2
 Village of Fortuna, Test 2

(Log furnished by Schnell Inc.)

Glacial drift:			
	Sand and gravel-----	4	4
	Clay, brown-----	15	19
	Clay, blue-----	10	29
	Gravel-----	2	31
	Clay, blue-----	5	36
	Gravel-----	2	38
	Clay, blue-----	9	47
	Sand and gravel-----	8	55
	Clay, blue-----	23	78
	Sand, gravel and lignite-----	21	99
	Clay-----	1	100

163-101-35cac3
 Village of Fortuna, Test 3

(Log furnished by Schnell Inc.)

	Sand and gravel-----	14	14
	Clay, brown-----	6	20
	Clay, blue-----	74	94
	Gravel-----	2	96
	Clay-----	4	100

163-101-35cac5
 Village of Fortuna, Test 4

(Log furnished by Schnell Inc.)

	Sand and gravel-----	8	8
	Clay-----	52	60
	Gravel-----	3	63
	Clay-----	20	83
	Sand-----	5	88
	Clay-----	12	100

163-101-35cbb
Test hole 3075

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Till, moderate-yellowish-brown, oxidized-----	32	32
	Till, olive-gray-----	15	47
	Sand, very fine to medium (top few feet fine to coarse), subrounded; predominantly quartz, limestone, lignite, and shale-----	25	72
	Till, olive-gray-----	4	76
	Sand, very fine to medium, silty; predominantly quartz, lignite, and limestone-----	14	90
	Gravel, medium sand through large pebbles interbedded with olive-gray, calcareous, sandy clay (till?)-----	10	100
	Sand, very fine to coarse, interbedded with olive-gray, silty clay-----	60	160
	Silt, olive-gray, clayey, with a few thin fine sand lenses-----	30	190
	Till, olive-gray-----	13	203
	Sand, very fine to small pebbles, unsorted, subangular to subrounded-----	9	212
	Till, olive-gray-----	8	220
	Sand, fine to very coarse, generally subrounded-----	25	245
	Till, olive-gray-----	92	337
	Sand, (from electric log)-----	9	346
	Till, olive-gray-----	292	638
Cannonball (?) Formation:			
	Silt, olive-gray to light-olive-gray, very calcareous; contains some unidentified black and green specks-----	6	644
	Limestone, light-gray, indurated-----	5	649
	Silt, light-olive-gray, very calcareous; contains some unidentified black and green specks-----	16	665

163-101-35cbc
Village of Fortuna, Test 6

(Log furnished by Mann Drilling Co.)

Till-----	42	42
Gravel-----	2	44
Till-----	8	52
Gravel with till layers-----	21	73
Till-----	7	80
Sand-----	27	107
Till-----	13	120

163-101-35ccb1
Village of Fortuna, Test 5

(Log furnished by Schnell, Inc.)

Gravel-----	3	3
Till, brown-----	12	15
Till, gray-----	5	20
Till, sandy-----	4	24
Till, gray-----	41	65
Sand, fine to medium with lignite-----	45	110
Till, clay-----	10	120

163-101-35ccb₂
Village of Fortuna, Well 4

(Log furnished by Mann Drilling Co.)

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Gravel-----	4	4
	Till-----	22	26
	Gravel with till layers-----	32	58
	Till-----	6	64
	Sand, fine to coarse-----	55	119
	Till-----	16	135

163-102-2baa
Stanley Tangedal

(Log furnished by Marinus Jensen)

	Clay, sandy, brown-----	42	42
	Gravel-----	2	44
	Clay, sandy-----	11	55
	Gravel-----	5	60
	Clay, brown-----	10	70
	Clay, blue-----	14	84
	Gravel and rocks-----	7	91
	Sand-----	23	114
	Clay, sandy-----	37	151
	Sand-----	1	152
	Clay, sandy-----	1	153
	Gravel-----	1	154
	Clay, sandy-----	6	160
	Sand-----	10	170

163-102-3dda,
Emmett Drawboñd

(Log furnished by Marinus Jensen)

	Clay, sandy, brown-----	45	45
	Clay, sandy, blue-----	6	51
	Gravel, dry-----	7	58
	Clay, blue-----	3	61
	Gravel-----	16	77

163-102-13aad
Test hole 3008

Glacial drift:			
	Soil-----	2	2
	Gravel and sand, medium sand to large pebbles, oxidized-----	10	12
	Sand, and gravel, medium sand to large pebbles; composition varied with abundant quartz, lime- stone and shale pebbles-----	36	48
	Till, dark-greenish-gray-----	14	62
	Sand, medium to very coarse with some silt and gravel, angular to subrounded-----	7	69
	Till, dark-greenish-gray-----	104	173
	Sand, silty to fine, abundant lignite particles--	10	183
	Gravel, predominantly lignite, angular to rounded-----	8	191

163-102-13aad--Continued
Test hole 3008

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift--Continued:			
	Sand, silty to fine, abundant lignite particles--	11	202
	Till, light-olive-gray to light-olive-brown, slightly oxidized-----	8	210
	Sand and gravel, coarse sand and small pebbles, abundant brownish pebbles, and some lignite, scoria, and pyrite-----	26	236
Tongue River Formation:			
	Sand, silty to fine, light-olive-brown, oxidized and bluish gray, unoxidized-----	14	250

163-102-33cdc,
Test hole 3010

Glacial drift:			
	Gravel and sand, medium sand to cobbles, oxidized	7	7
	Till, dark-greenish-gray-----	9	16
	Gravel-----	1	17
	Till, dark-greenish-gray-----	10	27
	Gravel, coarse sand to cobbles, rounded; abundant limestone pebbles-----	13	40

163-102-33cdd,
Test hole 2244

Glacial drift:			
	Soil, gravelly loam, black-----	1	1
	Clay, silty and sandy, dark brown-----	4	5
	Gravel, sandy, poorly sorted, subangular to subrounded-----	22	27
	Till, silty, olive gray-----	15	42
	Sand, medium to very coarse with some pebbles, poorly sorted, subrounded-----	18	60
	Gravel, fine to coarse, poorly sorted, sub- rounded-----	15	75
	Till, olive-gray-----	51	126
	Clay, sandy, dusky yellow green, partially oxi- dized (thin coarse sand and fine gravel lenses were encountered but only a few sand grains and granules were found in samples)-----	49	175
	Gravel, dark brown, fine to coarse, well sorted, subrounded-----	24	199
Tongue River Formation:			
	Shale, olive gray to greenish gray, moderately hard-----	11	210
	Shale, light greenish gray to greenish gray-----	10	220

163-102-35dbc
Louis Pulvermacher

(Log furnished by Marinus Jensen)

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
	Sand and gravel-----	40	40
	Clay, blue-----	36	76
	Quicksand-----	9	85
	Clay, sandy-----	5	90
	Gravel-----	8	98

163-102-36acb
U. S. Air Force

(Log furnished by Independent Drilling Co.)

Gravel and sand-----	5	5
Clay, sandy-----	5	10
Rock and gravel-----	10	20
Clay, yellow-----	5	25
Clay, sandy-----	5	30
Sand-----	15	45
Clay, sandy-----	5	50
Gravel and sand-----	10	60
Clay, sandy-----	5	65
Clay-----	10	75
Sand-----	5	80
Clay, sandy-----	10	90
Clay, sandy, yellow-----	30	120
Clay, yellow-----	5	125
Sandy or sand-----	10	135
Sand, clean-----	10	145
Clay, sandy-----	5	150
Coal, soft-----	10	160
Coal-----	5	165
Clay, blue-----	40	205
Shale, gray-----	20	225
Clay, sandy-----	10	235
Coal and shale layers-----	10	245
Shale and clay-----	20	265
Coal, lignite-----	5	270
Shale or clay-----	5	275
Shale-----	62	337
Rock-----	2	339
Shale-----	43	382
Sand, gravel, coal-----	18	400

163-103-11ddd
Test hole 2243

Glacial drift:

Gravel, fine to medium, and medium to coarse sand, subangular to subrounded, highly oxidized-----	15	15
Till, olive gray-----	5	20
Sand, fine to coarse-----	1	21
Till, olive gray-----	186	207
Gravel (?) no returns, drills like it's cemented-----	2	209

Tongue River Formation:

Shale, sandy, light olive gray		
Shale, silty, light olive gray, and		
Clay, lignite, black (could not identify depths of individual lenses. Driller picked Tongue River Formation at 217 from drill action)-----	32	241

163-103-36cdc
Test hole 3009

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:	Soil-----	1	1
	Sand, fine to coarse, some clay and subrounded gravel, oxidized-----	7	8
	Gravel, and sand, large pebbles, to fine sand, oxi- dized; pebbles predominantly limestone-----	5	13
	Till, moderate-yellowish-brown, oxidized-----	4	17
	Till, dark-greenish-gray-----	43	60
	Till, dark-yellowish-brown, oxidized, abundant limestone shale and lignite particles-----	13	73
	Till, olive-gray, partly oxidized-----	15	88
Tongue River Formation:	Silt and sand, dusky-yellowish-orange (apparently interbedded) oxidized; abundant lignite fragments-----	24	112
	Lignite-----	1	113
	Shale, silty, olive-gray, limitic particles common-----	7	120

164-95-36ddd
Joseph Lukach

(Log furnished by Oscar Weber)

Clay, mixed-----	24	24
Gravel, dry-----	7	31
Clay and gravel-----	2	33
Gravel, dry-----	4	37
Sand and clay mixed, brown-----	13	50
Clay, blue-----	34	84
Sandstone, blue-----	6	90
Clay, blue-----	2	92

164-96-34edd
Francis Bacon

(Log furnished by Oscar Weber)

Missing-----	28	28
Gravel, dry-----	3	31
Gravel and clay (rock, 39 to 40 ft)-----	19	50
Gravel and rocks-----	10	60
Clay, sandy with gravel-----	4	64
Missing-----	6	70
Clay-----	7	77
Clay, sandy-----	3	80
Sandy, some clay-----	2.5	82.5
Sandy-----	13.5	96
Clay, sandy layers-----	2	98
Clay, tough, (trace of coal 102 and 109 feet)-----	12	110
Clay, sandy-----	8.5	118.5
Clay, sandy, white, hard-----	13.5	132
Sandstone, hard-----	1	133

164-97-31daa
Test hole 3018

<u>Formation</u>	<u>Material</u>	<u>Thickness</u> (feet)	<u>Depth</u> (feet)
Glacial drift:			
	Fill-----	6	6
	Gravel, fine sand to very large pebbles, oxidized-----	3	9
	Till, dark-yellowish-orange, oxidized-----	5	14
	Till, dark-greenish-gray; contains some lignite and pyrite-----	17	31
	Sand, very fine to granule gravel, unsorted, subangular-----	5	36
	Till, dark-greenish-gray, contains lenses of fine to very fine sand-----	24	60
	Till, dark-greenish-gray; contains some lignite fragments-----	80	140
Tongue River Formation:			
	Sandstone, very fine to medium dusky-yellow, oxidized, contains mica flakes and lignite particles-----	15	155
	Sandstone, very fine to medium, bluish-gray, contains mica flakes and lignite particles-----	5	160

164-97-32dcd
T. S. Stuart

(Log furnished by Marinus Jensen)

Clay, brown-----	15	15
Sand and gravel-----	10	25
Clay, brown-----	20	45
Gravel-----	17	62
Clay, blue-----	115.5	177.5
Sand-----	6.5	184

164-101-28bc₁
U. S. Custom Station, no. 1

(Log furnished by Schnell Inc.)

Clay, brown-----	34	34
Clay, blue-----	67	101
Gravel-----	5	106
Clay, blue-----	72	178
Sand and gravel with lignite-----	27	205
Clay-----	15	220

164-101-28bc₂
U. S. Custom Station No. 2

(Log furnished by Schnell Inc.)

Clay, yellow-----	28	28
Clay-----	154	182
Sand-----	22	204
Clay-----	6	210
Gravel-----	5	215
Clay-----	2	217
Gravel-----	5	222
Clay-----	11	233
Gravel-----	12	245

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

Depth to water in feet below land surface

160-97-13bbb							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
1963		1963		1964		1964	
June 13	32.65	Oct. 10	33.82	April 13	32.98	Aug. 18	34.08
July 12	32.94	Nov. 12	34.33	May 12	33.28	Sept. 15	33.91
Aug. 13	32.56	1964		June 25	33.60	Oct. 12	34.43
Sept. 10	33.59	March 12	32.84	July 9	33.56	Nov. 9	34.20

160-97-32daa							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
1962		1963		1964		1964	
July 12	28.50	July 12	47.56	Jan. 14	27.91	Aug. 18	30.34
Aug. 22	28.13	July 25	42.86	Feb. 12	27.58	Sept. 15	28.72
Sept. 14	27.99	Aug. 13	33.27	March 11	27.34	Oct. 12	36.12
Sept. 27	27.22	Sept. 10	29.22	April 13	27.26	Nov. 9	29.55
Dec. 5	28.34	Oct. 9	52	May 12	27.24	Dec. 7	28.52
1963		1963		1964		1964	
June 13	26.84	Nov. 12	30.46	June 16	32.04		
		Dec. 17	28.38	July 9	31.43		

160-99-3bbb1							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
1963		1963		1964		1964	
July 11	13.57	Dec. 17	12.86	April 13	12.88	Sept. 15	12.71
Aug. 13	13.29	1964		May 13	12.76	Oct. 12	12.70
Sept. 10	12.98	Jan. 14	12.86	June 15	12.65	Nov. 9	12.74
Oct. 9	12.86	Feb. 12	12.92	July 9	12.33	Dec. 7	12.74
Nov. 12	12.88	March 12	12.96	Aug. 17	12.68		

160-99-3bbb2							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
1963		1963		1964		1964	
July 11	7.98	Dec. 17	8.21	April 13	8.03	Sept. 15	8.77
Aug. 13	8.36	1964		May 13	8.09	Oct. 12	8.77
Sept. 10	8.07	Jan. 14	8.13	June 15	8.18	Nov. 9	8.74
Oct. 9	8.12	Feb. 12	8.08	July 9	8.05	Dec. 7	8.69
Nov. 12	8.26	March 12	8.06	Aug. 17	8.75		

160-103-16bbb							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
1963		1964		1964		1964	
Nov. 12	43.68	April 13	43.32	Aug. 17	43.23	Dec. 8	43.16
1964		May 13	43.35	Sept. 15	43.21		
Jan. 14	43.15	June 13	43.35	Oct. 13	43.19		
March 11	43.21	July 9	43.27	Nov. 8	43.17		

161-99-31ccc							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
1963		1963		1964		1964	
July 12	58.67	Nov. 12	57.14	June 25	57.04	Oct. 12	57.36
Aug. 13	57.54	1964		July 9	57.08	Nov. 9	57.41
Sept. 10	57.21	March 12	57.33	Aug. 17	57.18		
Oct. 9	57.08	May 13	57.00	Sept. 15	57.27		

Depth to water in feet below land surface

161-102-27cbb

Date	Water level	Date	Water level	Date	Water level	Date	Water level
1962		1963		1964		1964	
Aug. 4	55.50	Dec. 18	71.36	April 13	66.97	Sept. 15	60.60
1963		1964		May 13	61.52	Oct. 13	67.01
Aug. 13	54.97	Jan. 14	73.73	June 13	55.86	Nov. 9	69.61
Sept. 10	55.31	Feb. 12	73.11	July 9	67.73	Dec. 8	67.76
Nov. 13	67.46	March 11	69.78	Aug. 17	59.35		

162-95-1bbb

Date	Water level	Date	Water level	Date	Water level	Date	Water level
1963		1964		1964		1964	
July 24	7.98	Jan. 15	7.79	June 15	7.64	Nov. 9	8.72
Aug. 14	7.23	Feb. 12	7.96	July 10	6.81	Dec. 7	8.87
Sept. 11	6.55	March 12	8.46	Aug. 18	8.61		
Oct. 11	7.27	April 13	8.37	Sept. 15	8.80		
Nov. 12	7.87	May 12	6.90	Oct. 12	8.89		

162-95-15bbb

Date	Water level	Date	Water level	Date	Water level	Date	Water level
1947		1963		1964		1964	
May 12	33.05	Nov. 12	29.68	June 15	29.52	Nov. 9	29.79
1963		1964		July 10	28.97	Dec. 7	35.40
Aug. 14	29.99	March 12	30.28	Aug. 18	29.03		
Sept. 10	29.32	April 13	30.07	Sept. 15	29.07		
Oct. 11	29.50	May 12	29.87	Oct. 12	30.21		

162-97-6dab

Date	Water level	Date	Water level	Date	Water level	Date	Water level
1963		1963		1964		1964	
June 25	13.20	Nov. 13	13.59	March 11	14.71	Aug. 18	15.49
July 12	12.90	Dec. 18	13.91	April 14	12.66	Sept. 16	16.59
Aug. 14	13.92	1964		May 13	11.76	Oct. 12	15.73
Sept. 11	12.38	Jan. 15	14.72	June 16	12.57		
Oct. 10	12.77	Feb. 12	14.70	July 9	12.97		

162-97-21bbc

Date	Water level	Date	Water level	Date	Water level	Date	Water level
1945		1947		1963		1964	
Sept. 8	16.85	Nov. 6	16.54	Dec. 18	15.50	July 9	14.64
1946		1963		1964		Aug. 18	14.94
April 8	16.62	June 25	15.43	Jan. 15	15.45	Sept. 16	15.31
July 18	16.58	July 12	15.41	Feb. 12	15.60	Oct. 12	15.45
Aug. 30	16.52	Aug. 14	15.56	March 12	15.34	Nov. 10	15.34
Oct. 15	17.01	Sept. 11	14.77	April 14	15.35	Dec. 8	15.53
1947		Oct. 10	15.00	May 13	14.92		
July 11	16.15	Nov. 13	15.10	June 13	14.97		

162-98-33cbb

Date	Water level	Date	Water level	Date	Water level	Date	Water level
1947		1963		1964		1964	
May 8	22.79	Oct. 9	22.51	May 13	22.36	Oct. 12	22.25
1963		Nov. 13	22.46	June 13	22.31	Nov. 10	22.26
July 2	22.66	1964		July 9	22.36		
Aug. 14	22.63	March 11	22.37	Aug. 17	22.36		
Sept. 11	22.57	April 14	22.40	Sept. 16	22.28		

Depth to water in feet below land surface

162-101-31aaa							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
1963		1964		1964		1964	
Nov. 13	33.88	Feb. 12	25.74	June 13	23.75	Oct. 13	23.17
Dec. 17	28.82	March 11	25.60	July 9	23.60	Nov. 9	23.04
		April 13	24.44	Aug. 17	23.54	Dec. 8	22.73
1964		May 13	24.01	Sept. 15	23.37		
Jan. 14	26.96						

162-102-7ccc							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
1964		1964		1964			
June 24	54.51	Aug. 17	54.50	Oct. 13	54.56		
July 9	54.27	Sept. 15	54.66	Nov. 9	54.57		

163-98-17bbb							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
1963		1963		1964		1964	
June 24	9.16	Nov. 13	4.60	March 11	4.92	Aug. 17	5.14
July 11	8.12	Dec. 18	4.62	April 14	5.30	Sept. 15	5.47
Aug. 13	7.67			May 13	5.30	Oct. 13	5.78
Sept. 10	5.65	1964		June 13	5.03	Nov. 10	6.07
Oct. 9	4.87	Jan. 15	4.69	July 10	4.89	Dec. 8	6.32
		Feb. 12	4.86				

163-99-18aaa							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
1963		1963		1964		1964	
June 12	34.15	Nov. 13	14.31	March 11	9.26	Aug. 17	7.75
July 11	12.90	Dec. 18	10.40	April 14	8.80	Sept. 15	7.93
Aug. 13	10.16			May 13	8.35	Oct. 13	7.99
Sept. 10	8.49	1964		June 13	7.92	Nov. 10	8.09
Oct. 9	7.94	Jan. 15	9.66	July 10	7.32	Dec. 8	8.08
		Feb. 12	9.29				

163-100-9aaa							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
1963		1964		1964		1964	
Nov. 3	43.13	Feb. 12	42.47	June 13	42.45	Oct. 13	42.35
Dec. 18	42.72	March 11	42.48	July 10	42.51	Nov. 10	42.28
		April 14	42.51	Aug. 17	42.48	Dec. 8	42.23
1964		May 13	42.60	Sept. 15	42.40		
Jan. 15	42.61						

163-101-35cbb							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
1963		1964		1964		1964	
Nov. 13	20.67	Feb. 12	23.19	June 13	24.97	Oct. 13	25.57
Dec. 17	21.78	March 11	23.76	July 9	25.21	Nov. 10	25.74
		April 13	24.26	Aug. 17	25.44	Dec. 8	25.88
1964		May 13	24.65	Sept. 15	25.52		
Jan. 14	22.52						

163-101-35ccb ₁					
Date	Water level	Date	Water level	Date	Water level
1963		1964		1964	
Oct. 8	10.79	Jan. 14	11.30	March 11	11.87
Nov. 13	10.75	Feb. 12	11.64	April 13	11.91

Depth to water in feet below land surface

163-102-33cdd1

Date	Water level	Date	Water level	Date	Water level	Date	Water level
1964		1964		1964		1964	
June 24	10.66	Aug. 17	10.82	Oct. 13	10.78	Dec. 8	10.73
July 10	10.74	Sept. 15	10.80	Nov. 9	10.78		

163-102-33cdd2

Date	Water level	Date	Water level	Date	Water level
1964		1964		1964	
June 12	12.46	July 8	12.44	Oct. 13	12.31
June 23	12.43	Aug. 17	12.49	Nov. 9	12.36
July 7	12.45	Sept. 15	12.26	Dec. 8	12.37

TABLE 4.--Partial chemical analyses of water from wells
in Divide County, North Dakota^{1/}

Location (1)	Depth (feet) (2)	Date of collection (1947) (3)	Bicar- bonate (HCO ₃) (4)	Carbonate (CO ₃) (5)	Chloride (Cl) (6)	Specific conductance (Micromhos at 25°C) (7)
161-97-20aba	150	Aug. 13	360	0	14	1,750
161-98-15bbb	130	do.	340	49	24	2,250
161-98-20bbb ₁	224	do.	605	0	14	1,910
162-95-4add ₃	365	May 28	1,740	108	88	2,990
162-95-5abb ₂	350	do.	1,640	123	123	2,870
162-95-7aba	238	do.	1,120	246	39	2,800
162-95-14ccc	122	May 26	585	0	1.0	1,230
162-95-18bdd	80	do.	1,050	0	8.0	2,530
162-96-5dcd ₁	320	May 29	1,320	59	44	3,560
162-96-15bbb ₁	200	do.	1,120	0	8.2	2,790
162-97-9aaa	110	May 12	643	0	21	2,800
162-97-10bbb	322	May 13	1,080	0	48	1,610
162-97-14aad	265	May 12	986	0	45	2,120
162-97-19ccc ₂	305	May 13	808	0	28	2,560
162-97-31dda	140	do.	559	0	9.0	1,890
162-97-36aaa	184	May 12	689	0	10	2,100
162-98-1bbb	300	May 13	970	0	23	2,050
162-98-1da	270	May 12	1,200	84	84	2,300
162-98-5add	107	May 6	886	0	3.0	2,630
162-98-12cda	160	May 12	1,340	0	98	2,440
162-98-12ddd	324	Oct. 24	1,190	0	70	2,120
162-98-13cd	350	May 12	636	0	15	2,040
162-98-23da ₃	400	do.	969	0	30	1,930
162-98-24aac	400	do.	1,430	0	63	2,160
162-98-26abb	362	do.	1,310	0	26	2,510
162-98-31aad	365	May 6	1,060	59	19	3,670
162-98-32bbc	385	do.	1,090	0	19	3,710
162-98-35ddd	100	May 12	667	0	20	2,540
162-99-34dab	508	May 6	842	0	7.0	2,090
163-95-1dcd ₁	190	May 29	605	0	11	2,120
163-95-14daa	120	do.	1,320	93	60	3,880
163-95-18bcd	143	do.	835	231	52	3,190
163-95-23bcc	120	May 26	945	49	64	5,380
163-95-32ddd	61	May 29	290	0	0	457
163-96-1cdd	237	May 26	1,300	113	84	2,880
163-96-6aad	205	May 12	966	0	63	2,620
163-96-13daa	105	May 26	750	64	45	3,220
163-97-4cbc	315	May 13	1,390	0	76	2,040
163-97-6dcd	253	May 6	1,510	0	95	2,430
163-97-7dda	162	do.	1,490	0	85	2,240
163-97-17cdd	370	May 13	1,560	0	86	2,390
163-97-22cdc ₃	562	do.	1,230	39	313	2,710
163-97-26bbb	438	Oct. 24	185	0	0	6,300
163-97-27ccb	455	May 26	1,260	0	91	1,990
163-97-31bcb	350	May 6	1,670	31	260	2,930
163-97-35bab ₁	275	May 13	891	0	44	1,390
163-98-1adc	280	May 6	1,410	55	60	2,620
163-98-21bbb	60	do.	490	0	33	2,690
163-98-23ddd	320	do.	1,420	0	73	2,400
163-98-25bbb	318	do.	1,450	0	78	2,320

^{1/} LaRocque and others, 1963.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
163-98-26cdc	290	May 6	1,150	0	50	2,020
163-98-30aba	160	do.	908	0	14	2,630
163-98-30bba	180	do.	804	0	10	2,260
163-98-32aba	498	do.	1,130	142	23	3,090
163-99-2ddd	308	do.	1,560	45	230	2,920
163-99-11cdd	260	May 13	1,570	27	19	4,200
163-99-13abb	200	May 12	1,400	0	19	3,110
163-99-23aab	418	May 6	1,360	53	16	3,170
163-99-24bbb	400	do.	1,410	83	4.0	2,200
164-95-28daa	165	May 28	745	0	13	2,370
164-95-29ccc	138	May 27	910	0	23	2,600
164-95-33ddd	140	May 28	655	0	16	2,980
164-95-35ddd ₁	130	May 29	750	0	18	2,840
164-95-36ddd	92	do.	520	0	37	4,590
164-96-29dda	200	May 13	738	0	24	1,360
164-96-34aaa	84	May 29	455	0	12	1,620
164-97-31bcc	228	May 6	1,430	47	76	2,500
164-97-33bcc	185	May 12	1,190	0	26	1,840
164-98-34cdd	250	May 6	1,460	47	50	2,580

Table 5--Chemical analyses of water in Divide County, North Dakota--Continued

Location	Depth (feet)	Source of water	Date of collection	Temp (°F)	Saline (mg/L)	Total dissolved (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sulfate (mg/L)	Nitrate (mg/L)	Iron (mg/L)	Copper (mg/L)	Sulfide (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Boron (mg/L)	Dissolved solids		Inorganic as CaCO ₃		Sulfate-to-calcium ratio	Specific conductance (micro mhos/cm at 25°C)	pH	Remarks		
																		Total (mg/L)	Non-carbonate (mg/L)	Calcium (mg/L)	Magnesium (mg/L)						
165-99-220a	222	W	10-18-63	16	80	7.12	16	9.7	660	1.6	1,340	0	675	10	1.3	1.5	.00	2,090	2,130	138	0	87	23	2,990	8.1		
165-99-270a	350	W	7-2-63	16	7.4	2.40	3.0	1.0	656	2.3	1,377	0	314	66	3.6	1.0	1.18	1,961	1,698	108	0	84	30	2,821	8.1		
165-99-100a	215	W	1962	..	..	..	..	..	230	6.4	677	0	825	15	1.4	22	0	2,040	1,646	970	0	98	60	2,690	9.1	c
165-99-110a	260	W	10-18-63	17	9.3	2.84	13	2.4	1,046	2.8	1,292	1.4	965	15	1.6	4.0	.68	2,040	2,930	40	0	93	70	3,320	7.4	b	
165-99-120a	318 & 300	W	10-18-63	19	12	1.0	3.0	2.9	1,027	2.9	1,000	1.0	740	24	1.4	6.0	0	2,030	2,094	1,040	0	99	80	3,420	8.4		
165-99-130a	25	W	10-9-63	..	..	..	..	..	47	17	376	19	861	24	..	2.0	0	1,646	1,712	270	294	77	..	2,577	7.0	
165-99-220a	25	W	1962	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	780	408	..	..	2,482	8.1	b
165-99-350a	196	W	10-17-63	16	19	4.3	206	63	215	1.4	727	0	625	7.0	.5	4.0	.00	1,510	1,640	660	184	37	3.4	2,230	7.8		
165-100-00a	110	W	10-30-63	15	10	1.0	5	7.4	379	17	644	0	675	16	..	12	.28	1,951	1,594	445	0	64	7.9	2,319	7.9		
165-100-100a	21	W	10-10-63	14	18	2.8	104	30	32	15	977	0	573	8.0	..	4.0	.10	1,675	1,760	1,190	761	13	1.5	2,319	7.5	b	
165-100-200a	188	W	10-16-63	14	21	..	..	..	..	..	..	..	..	..	..	..	..	1,400	1,410	385	0	64	7.4	1,970	7.8	b
165-100-300a	40	W	2-6-64	1,290	b
165-100-310a	30	W	10-10-63	15	16	3.6	66	35	410	6.1	831	0	2.0	..	..	..	..	1,380	1,370	368	30	7.4	..	2,390	8.2	b
165-100-320a	60	W	1962	256	b
165-101-350a	100	W	10-9-63	510	110	0	b
165-101-350a	240	W	10-9-63	600	145	36	b, d
165-102-00a	80	W	10-15-63	15	11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	865	495	18	1.3	1,780	7.4	
165-102-110a	110	W	10-15-63	15	19	6.0	121	19	88	9.2	498	0	575	4.0	..	10	..	1,270	1,370	855	0	18	2.4	1,280	7.9		
165-102-110a	..	W	5-13-64	14	2.0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	466	73	35	1.0	1,180	8.2	
165-102-110a	..	W	5-21-63	14	21	..	..	..	..	..	..	..	..	..	..	..	..	..	..	566	165	18	1.2	1,180	7.9	
165-102-330a	40	W	7-4-64	15	19	..	..	..	..	..	..	..	..	..	..	..	..	..	..	428	159	20	1.2	1,350	7.7	
165-102-330a	40	W	7-4-64	15	19	..	..	..	..	..	..	..	..	..	..	..	..	..	..	428	159	20	1.2	1,350	7.7	
165-102-330a	40	W	7-4-64	15	19	..	..	..	..	..	..	..	..	..	..	..	..	..	..	428	159	20	1.2	1,350	7.7	
165-102-330a	400	W	2-7-58	19	..	2.1	194	109	273	10	104	0	765	16	..	..	..	..	..	896	236	39	3.9	2,390	7.1	d
165-102-360a	40	W	6-29-59	19	..	4.3	188	109	315	4.5	866	484	765	20	..	..	..	..	..	896	186	145	3.6	2,390	7.1	a
165-102-360a	40	W	10-18-63	14	23	186	186	0	b
164-99-310a	95	W	10-18-63	14	23	186	186	0	b
164-101-00a	205	W	1962	370	2,095	7.4	
164-101-00a	219	W	1962	370	2,095	7.4	
164-101-00a	40	W	10-10-63	370	2,413	7.4	

1/ Sample of combined flow of wells 1 and 3, 318 and 300 feet respectively