Overview of Environmental and Hydrogeologic Conditions near Big Lake, Alaska

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U.S. GEOLOGICAL SURVEY

Open-File Report 95-403

Prepared in cooperation with the

FEDERAL AVIATION ADMINISTRATION

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Anchorage, Alaska
1995

U.S. DEPARTMENT OF THE INTERIOR
BRUCE BABBITT, Secretary

U.S. GEOLOGICAL SURVEY
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CONVERSION FACTORS, VERTICAL DATUM, AND ABBREVIATIONS

Multiply	By	To obtain
centimeter per second (cm/s)	0.3937	foot per second
millimeter (mm)	0.03937	inch
meter (m)	3.281	foot
square meter (m^2)	10.76	square foot
kilometer (km)	0.6214	mile
square kilometer (km^2)	0.3861	square mile
liter per second (L/s)	15.85	gallon per minute
cubic meter (m^3)	264.2	gallon
cubic meter per second per square kilometer [$(m^3/s)/km^2$]	91.4	cubic foot per second per square mile

In this report, temperature is reported in degrees Celsius (°C), which can be converted to degrees Fahrenheit (°F) by the following equation:

$$°F = 1.8\ (°C) + 32$$

ABBREVIATED WATER-QUALITY UNITS

Chemical concentration and water temperature are given only in metric units. Chemical concentration in water is given in milligrams per liter (mg/L) or micrograms per liter (µg/L). Milligrams per liter is a unit expressing the solute mass per unit volume (liter) of water. Specific conductance is given in microsiemens per centimeter (µS/cm) at 25 °C.

VERTICAL DATUM

Sea level: In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929—A geodetic datum derived from a general adjustment of the first-order level nets of the United States and Canada, formerly called Sea Level Datum of 1929.

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ABSTRACT

Big Lake, an inland lake about 12 square kilometers in area, is in south-central Alaska at latitude 61°33' N., and longitude 149°55' W. The community of Big Lake is on the shore of Big Lake, about 30 kilometers north of Anchorage. The Federal Aviation Administration owns or operates airway support facilities near Big Lake at latitude 61°34' N., and longitude 149°57' W. They wish to consider environmental and hydrogeologic conditions when evaluating options for environmental compliance and remediation at these facilities. Big Lake is in a transitional climate zone where seasonal climate patterns are not sharply defined, fluctuate from year to year, and may resemble those of either the maritime or continental climate zones. The local vegetation consists of lowland spruce-hardwood forest and low brush muskeg. Little is known about the composition and structure of the bedrock around Big Lake. The Talkeetna Mountains to the northeast consist chiefly of igneous rocks including granitic rocks, lava, and tuff; the Chugach Mountains to the southeast consist of granitic intrusive rocks of Mesozoic age, metamorphosed sedimentary rocks, and greenstone; and the Alaska Range to the northwest consists of granites, volcanic rocks, argillite, shale, sandstone, and siltstone. The principal surficial materials near Big Lake consist of outwash sand and gravel deposits, partly saturated gravel in ground moraines, and windblown sediment. Relief is low and drainage in the Big Lake area is poor; there are large areas of swampy ground and numerous lakes and ponds. The glacially derived sediments near Big Lake contain ground water in both confined and unconfined aquifers. Residents in the Big Lake area use ground water as their principal drinking-water source. Big Lake is a potential alternative drinking-water source; however, data are inadequate to characterize the present quality of Big Lake water in relation to current drinking-water standards.

INTRODUCTION

The Federal Aviation Administration (FAA) owns and (or) operates airway support and navigational facilities throughout Alaska. At many of these sites, fuels and potentially hazardous materials such as solvents, polychlorinated biphenyls, and pesticides may have been used and (or) disposed of. To determine if environmentally hazardous materials have been spilled or discarded at the sites, the FAA is conducting environmental studies mandated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA). To complete these more comprehensive environmental studies, the FAA requires information on the hydrology and geology of areas surrounding the sites. This report, the product of compilation, review, and summary of existing hydrologic and geologic data by the U.S. Geological Survey (USGS), in cooperation with the FAA, provides such information for the FAA facility and nearby areas at Big Lake, Alaska. Also presented in this report are brief descriptions of the history of the FAA facility and the physical setting of the area.

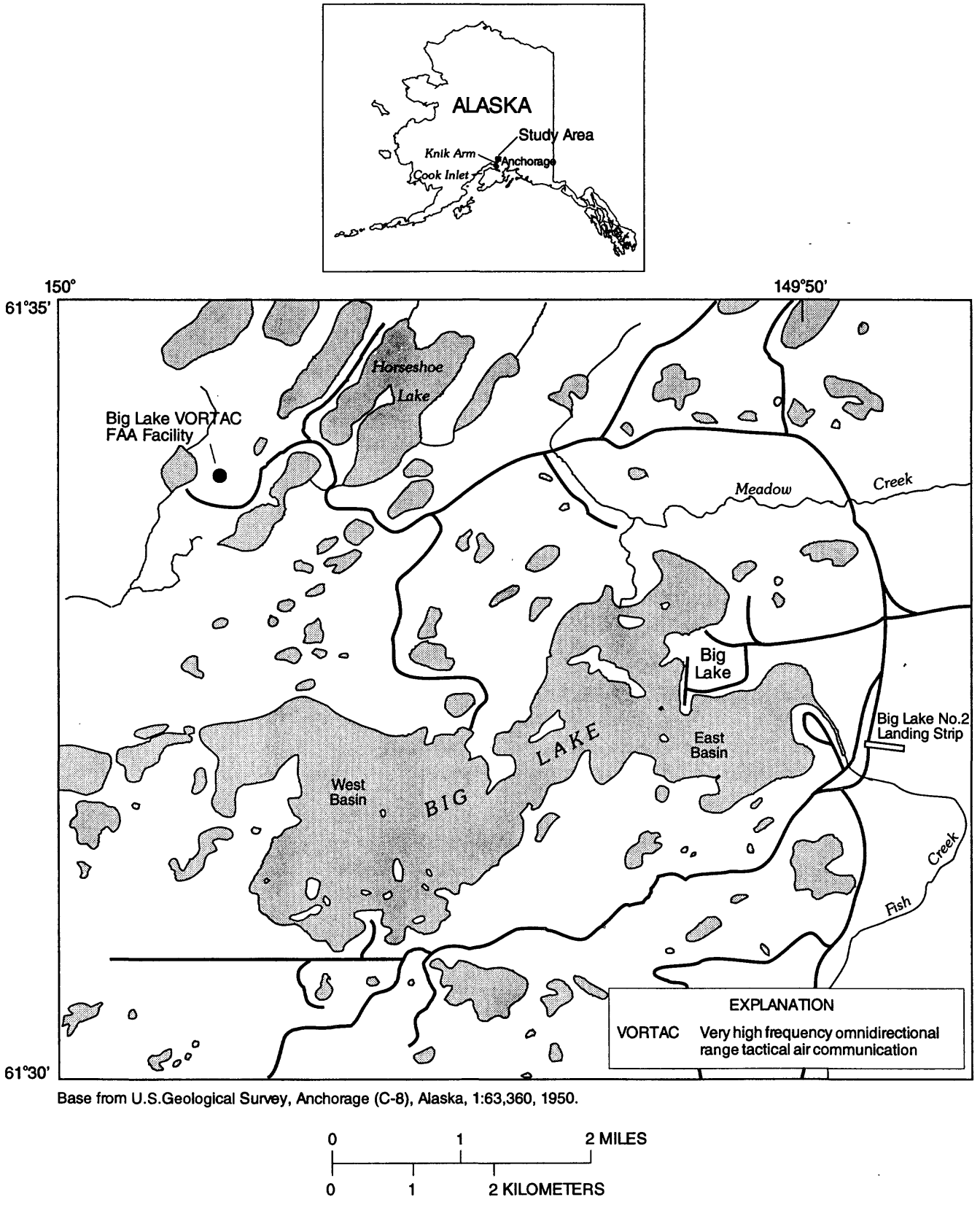
BACKGROUND

Location

Big Lake is in south-central Alaska at lat 61°33' N., long 149°55' W. The community of Big Lake is on the shore of Big Lake, about 30 km north of Anchorage (fig. 1). The area is part of the Upper Matanuska-Susitna Valley, a glacial trough containing longitudinal bedrock hills and small narrow lakes (Wahrhaftig, 1965). The Big Lake FAA facility is at lat 61°34' N., long 149°57' W., about 3 km northwest of Big Lake and about 1.5 km west of Horseshoe Lake (fig. 1).

Facility History

The FAA involvement near Big Lake began in 1962 when land was leased from the Alaska Department of Natural Resources to construct a Very High Frequency Omnidirectional Range Station/Tactical Air Communication facility (VORTAC). The VORTAC facility is maintained by personnel stationed in Anchorage and is the only FAA facility at Big Lake. A more detailed description of the VORTAC facility at Big Lake and a list of suspected sources of environmental contamination is given in an environmental compliance investigation report by Ecology and Environment Inc., (1993).



Base from U.S.Geological Survey, Anchorage (C-8), Alaska, 1:63,360, 1950.

Figure 1. Location of Big Lake and the Federal Aviation Administration facility.

Climate

Big Lake is in a transitional climate zone. Seasonal climate patterns in this zone are not sharply defined, fluctuate from year to year, and may resemble those of either the maritime or continental climate zones (Hartman and Johnson, 1984). Big Lake has a mean annual temperature of 0.6 °C, but temperatures range from a June mean maximum of 21.1 °C to a March mean minimum of -19.7 °C (Leslie, 1989; table 1 this report). Mean annual precipitation is about 565 mm and mean annual snowfall is about 1,490 mm. Values for mean monthly and annual temperature, precipitation, and snowfall for the period 1957 to 1961 for Big Lake, Alaska, are given in table 1.

Table 1. Mean monthly and annual temperature, precipitation, and snowfall, for the period 1957-61, Big Lake, Alaska

[Modified from Leslie, 1989; °C, degree Celsius; mm, millimeter]

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
	Temperature (°C)												
Mean maximum	-3.6	-4.2	-1.8	6.7	16.3	21.1	20.1	18.1	12.7	4.4	-4.6	-7.6	6.4
	(Record maximum 31.7 °C, July 1960)												
Mean minimum	-12.6	-14.4	-19.7	-3.5	0.7	6.3	7.8	6.3	2.9	-5.6	-14.8	-16.9	-5.3
	(Record minimum -42.2 °C, December 1961)												
Mean	-8.1	-9.3	-10.8	1.6	8.5	13.7	13.9	12.2	7.8	-0.6	-9.7	-12.3	0.6
	Precipitation, in millimeters of moisture												Total
	28	8	40	46	13	28	89	66	140	35	31	41	565
	Snowfall, in millimeters												Total
	58	218	112	175	0.0	0.0	0.0	0.0	0.0	285	386	252	1,486

Vegetation

The vegetation surrounding Big Lake consists of lowland spruce-hardwood forest and low brush muskeg (Viereck and Little, 1972; Selkregg, 1976). The forested areas typically occur on shallow peat deposits, glacial deposits, and outwash plains and consist of evergreen and deciduous trees, including stands of black spruce. Undergrowth in the forested areas consists of willows and other brush (Selkregg, 1976). Dwarf shrub vegetation dominates areas of low brush muskeg. Western hemlock, Alaska cedar, sedges, mosses, and lichens are also found in these areas (Selkregg, 1976).

GEOLOGY

Bedrock Geology

The bedrock of the Matanuska-Susitna Valley is described by Trainer (1960) and Freethey and Scully (1980). The Talkeetna Mountains, about 20 km to the northeast, consist of igneous rocks including granitic rocks, lava, and tuff. Sedimentary rocks of Cretaceous and Tertiary age form the south flank of the mountains (Trainer, 1960). The Chugach Mountains, about 50 km to the southeast, consist of Mesozoic granitic intrusive rocks, metamorphosed sedimentary rocks—mainly slate, argillite, and graywacke—and greenstone (Trainer, 1960). The Alaska Range, about 75 km to the northwest, consists of granites, volcanic rocks, argillite, shale, sandstone, and siltstone (Freethey and Scully, 1980). Sedimentary rocks consisting of sandstone, shale, and coal of Cretaceous age extend down the Matanuska Valley to Moose Creek, about 45 km northeast of Big Lake (Trainer, 1960). Little is known about the composition and structure of the bedrock around Big Lake. Wells drilled to depths greater than 60 m terminated in unconsolidated materials, which may be more than 300 m thick in the Big Lake area (appendix 1; Freethey and Scully, 1980).

Surficial Geology

Unconsolidated materials of Quaternary age extend over most of the Matanuska-Susitna Valley floor and are predominately till, glacial outwash, and glacial-lacustrine deposits (Trainer, 1960; Freethey and Scully, 1980). The principal surficial deposits near Big Lake are outwash sand and gravel, partly saturated gravel in ground moraines, and windblown sediment (Trainer, 1960).

Outwash deposits are predominately sand, pebbly sand, gravel, and silt. Information from well logs indicates that individual layers range from a meter to as much as 70 m in thickness (Trainer, 1960; Freethey and Scully, 1980). The bedding is moderately well developed and cross-bedding is common (Trainer, 1960).

Till is the principal component of the end moraine near Big Lake, which marks the westernmost extent of glacial advance (Trainer, 1960). Till in the Big Lake area consists of subangular to rounded rock fragments in a matrix of sand, silt, and clay. The rock fragments are derived from adjacent mountains and range in size from sand to boulders (Trainer, 1960). Because of its clay composition, the end moraine likely forms a shallow ground-water divide.

Glacial-lacustrine deposits, consisting of silt or sandy silt (loess), cover the land surface everywhere in the Matanuska-Susitna Valley except on modern flood plains, tidal flats, and steep bedrock slopes (Trainer, 1960). These sediments are relatively impermeable and are the parent materials for most of the soils in the valley. The Big Lake area is typically free of permafrost (Ferrians, 1965). However, in lowland areas where surface insulation is high and incident solar radiation is low, isolated patches of permafrost are as thick as 9 m and range in area up to 50 m^2.

HYDROLOGY

Surface Water

Relief is low and drainage is poor near Big Lake and there are large areas of swampy ground and numerous lakes and ponds. Mean annual runoff in the area is about 0.005 $(m^3/s)/km^2$ (Freethey and Scully, 1980). Big Lake and Horseshoe Lake are the most significant surface-water bodies near the FAA VORTAC facility (fig. 1). Big Lake covers an area of about 12 km^2 and is located about 3 km southeast of the facility. Horseshoe Lake covers an area of about 3.5 km^2 and is about 1.5 km east of the facility.

Big Lake consists of an east and a west basin connected by a constriction near the middle of the lake (Woods, 1992; fig. 1). The lake contains 22 islands and the shoreline length, excluding islands, is about 27 km. The surface elevation of the lake is about 44 m and it has a mean depth of about 9 m (Woods, 1992). Meadow Creek is the major inlet stream and Fish Creek is the lake outlet (fig. 1). The VORTAC facility is not within the drainage basins of Big Lake and Horseshoe Lake. Contaminants spilled or disposed at the VORTAC facility, therefore, are unlikely to reach these surface-water bodies by surface drainage. However, they may be hydraulically connected to the shallow ground-water system.

During 1983-84, the USGS conducted a limnological study to evaluate potential eutrophication of Big Lake (Woods, 1992). Eutrophication is the enrichment of waters by nutrients, typically nitrogen and phosphorus. An excess of nutrients, generally the result of human activities, may result in increases in oxygen demand and primary production and a decrease in overall water quality. The Big Lake study involved describing and interpreting spatial and temporal variations in numerous physical, chemical, and biological characteristics. The results of the study are summarized in table 2. The lake was classified as oligotrophic, a condition characterized by 1) a low dissolved-nutrient concentration, 2) sparse, yet diverse plant and animal life, and 3) a high dissolved-oxygen concentration. However, upon summer stratification and under ice cover, the lake's bottom waters are rapidly depleted of oxygen (Woods, 1992). Consequently, if the oxygen demand increases, the lake is susceptible to eutrophication. Similar hydrologic data for Horseshoe Lake were not found.

Table 2. Summary of limnologic characteristics of Big Lake during 1983-84
[Modified from Woods, 1992; mg/L, milligrams per liter; µg/L, micrograms per liter; <, less than]

During May through October, the lake received 76 percent of the annual input of solar irradiance.
The maximum water temperature measured was 18.7 °C.
The lake was dimictic (stratifies in the summer and winter) and circulated in May and October.
Thermal stratification was well developed and persistent from June through September.
The spring circulation failed to completely reaerate the hypolimnion[1].
Water was of calcium bicarbonate type.
Specific conductance ranged from 85 to 161 µS/cm at (25 degrees Celsius).
pH ranged from 6.2 to 8.0.
Dissolved-oxygen concentrations ranged from 0 to 14.7 mg/L; percent saturation ranged from 0 to 124.
Total ammonia plus organic nitrogen ranged from 110 to 940 µg/L.
Dissolved-ammonia concentrations ranged from <1 to 502 µg/L.
Dissolved-nitrite plus nitrate concentrations ranged from <1 to 192 µg/L.
Total phosphorous ranged from 6 to 173 µg/L.
Dissolved orthophosphate ranged from 1 to 66 µg/L.
Nitrogen was the nutrient most likely to limit phytoplankton growth during the summer.
Chlorophyll-*a* averaged 2.5 µg/L but peaked at 46.5 µg/L.
Annual primary production was 29.6 grams of carbon/m^2; about 90 percent was produced during May-October.
Big Lake was oligotrophic[2] during 1983-84.

[1] The hypolimnion is the lower stratum of a lake. It is typically colder in temperature than upper layers and is relatively undisturbed.
[2] An oligotrophic lake is characterized by a low dissolved-nutrient concentration, sparse yet diverse aquatic life, and a high dissolved-oxygen concentration.

Ground Water

The glacially derived sediments near Big Lake contain ground water in both confined and unconfined aquifers (Trainer, 1960; Freethey and Scully, 1980). The principal aquifers near Big Lake are composed of outwash sand and gravel laid down by glacial meltwater streams (Trainer, 1960; Freethey and Scully, 1980). The till and the bedrock are aquifers of minor importance. Because till layers contain fine-grained materials such as silt and clay, they may act as confining beds. Till generally has low permeability, although locally thin layers of sandy material may transmit small quantities of water (Trainer, 1960). The bedrock is considered impermeable and yields water only from fractures, the location and frequency of which are unknown in the Big Lake area. Several wells in bedrock in other areas of the Matanuska-Susitna Valley have obtained saltwater that is thought to have been in the rock since the region was last covered by marine water (Trainer, 1960).

Numerous wells have been drilled in the Big Lake-Horseshoe Lake area (appendix 1). Most of the wells penetrate water-bearing sand and gravel outwash deposits that have hydraulic conductivities between $5x10^{-5}$ and 10^{-6} cm/s (Arctic Engineers Inc., 1982). These outwash deposits are of two principal forms. The first consists of 1- to 30-m-deep sheetlike deposits that lie just beneath the land surface (Trainer, 1960; Freethey and Scully, 1980; Dearborn and Allely, 1983). The water in these deposits is unconfined and overlies layers of till. The other outwash deposits are buried beneath till and may be as thick as 20 m. These deposits commonly contain confined, or artesian, ground water (Trainer, 1960; Freethey and Scully, 1980). The aquifers vary in thickness and grain-size composition and are laterally discontinuous (Trainer, 1960). The unconfined aquifer typically yields water at a rate of 0.3 to 3 L/s, and the confined aquifer may yield up to 18 L/s (Trainer, 1960; Freethey and Scully, 1980; Feulner, 1968; Glass, 1983).

Ground-water recharge near Big Lake is from several sources (Freethey and Scully, 1980). Shallow aquifers are recharged primarily by infiltration of streams, lakes, and precipitation. The deeper aquifers are recharged from adjacent aquifers by leakage through the confining layers. Some confined aquifers may receive additional recharge from upgradient areas where they are exposed to surface-water sources. Ground-water levels in the area generally fluctuate less than 1 m throughout the year (Glass, 1983). On a regional scale, ground-water flow is south-southwest from more upland areas toward Big Lake, Fish Creek, and, ultimately, Knik Arm.

Near Big Lake, the freshwater reservoir, from the ground surface to the saltwater-freshwater interface, is about 300 m thick (McGee, 1977). Salinity increases with depth, and the estimated sub-sea depth to water having salt concentrations greater than 16,800 mg/L sodium chloride is about 1,800 m.

DRINKING WATER

Residents in the Big Lake area use ground water as their principal drinking-water source. Most of the wells reach the unconfined aquifer at depths less than 10 m below the land surface (appendix 1; Freethey and Scully, 1980). Several wells deeper than 30 m reach the confined aquifer and reportedly flow at the surface (appendix 1).

In general, the ground water in the Matanuska-Susitna Valley is of adequate quality for domestic use (Trainer, 1960; Feulner, 1968; Bradley, 1976; Glass, 1983). During the last 40 years, water samples have been collected from till, outwash sand and gravel, windblown sediment, and bedrock (appendix 2). Ground water typically meets current drinking-water regulations (table 3 and appendix 2; U.S. Environmental Protection Agency, 1995). However, in some samples, concentrations of iron, manganese, chloride, and total dissolved solids exceed the recommended standard (appendix 2). Dissolved-solids concentrations range from about 50 to 200 mg/L in water from wells completed in the unconfined aquifer and from 150 to 1,400 mg/L in wells completed in the confined aquifer (Glass, 1983). In both the confined and unconfined aquifers, iron concentrations range from 0 to 7.2 mg/L, chloride concentrations range from 0 to 700 mg/L, and sulfate concentrations range from 0 to 130 mg/L (table 3). Big Lake contains about 100 million m^3 of water and could possibly be used as an alternative drinking-water source for nearby residents; however, data are inadequate to characterize the present quality of Big Lake water in relation to all current drinking-water standards.

Table 3. Selected water-quality data for wells near Big Lake, Alaska
[U.S. Environmental Protection Agency, 1995 and appendix 2; mg/L, milligrams per liter]

Constituent (or property)	USEPA drinking-water regulation (mg/L)	Ground-water, range in concentration (mg/L)
Total dissolved solids	500	54-1,430
Iron (Fe)	0.3	0-7.2
Chloride (Cl)	250	0-700
Sulfate (SO_4)	250	0-130
Manganese (Mn)	.05	.01-.46
Fluoride (F)	2	0-.5
pH (units)	6.5-8.5	6.1-8.7

SUMMARY

Big Lake is in south-central Alaska at lat 61°33' N., long 149°42' W. The community of Big Lake is on the shore of Big Lake, about 30 km north of Anchorage. The FAA operates a VORTAC facility near Big Lake. The area is in a transitional climate zone, characterized by climate patterns that are not sharply defined, fluctuate from year to year, and may resemble those of either the maritime or continental climate zones. The local vegetation consists of lowland spruce-hardwood forest and low brush muskeg. Little is known about the composition and structure of the bedrock around Big Lake. The Talkeetna Mountains to the northeast consist chiefly of igneous rocks including granitic rocks, lava, and tuff; the Chugach Mountains to the southeast consist of Mesozoic granitic intrusive rocks, metamorphosed sedimentary rocks, and greenstone; and the Alaska Range to the northwest consists of granites, volcanic rocks, argillite, shale, sandstone, and siltstone. Cretaceous sedimentary rocks consisting of sandstone, shale, and coal extend down the Matanuska-Susitna Valley to Moose Creek. The principal surficial materials near Big Lake are outwash sand and gravel deposits, partly saturated gravel in ground moraines, and windblown sediment. Drainage in the Big Lake area is poor, and there are large areas of swampy ground and numerous lakes and ponds. The glacially derived sediments near Big Lake contain ground water in both confined and unconfined aquifers. Local residents use ground water as their principal drinking-water source. Big Lake is a potential alternative drinking-water source; however, data are inadequate to characterize the present quality of Big Lake water in relation to current drinking-water standards.

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APPENDIX 1

Data from wells near Big Lake, Alaska

LOCAL WELL NUMBER		PRIMARY USE OF WATER	DEPTH OF WELL (FEET)	WATER LEVEL (FEET)	DATE WELL CONSTRUCTED	OWNER	ASSIGNOR OF OTHER IDENTIFIER
SB01600305ABAD1	001	U	--	--	10-22-60	UNION OIL BIG LAKE	UNION
SB01600402ABCB1	001	-	--	--	10-06-60	UNION OIL	UNION
SB01700316CDCA1	002	H	53.0	--	--	NERLAND JERRY	ROCKY LK ALASKA
SB01700319DCAB1	004	H	65.	4.5	03-29-83	DUCLOS PAUL&SARA	FARR SUB
						--	LAS
SB01700319DCAC1	002	H	30.0	2.00	03-21-73	ERICKSON EDWIN	--
SB01700319DCDA1	003	H	52.0	5.00	03-26-73	PEDERSON HARRY	--
SB01700319DDBC1	001	H	26.0	3.00	12-12-73	DAHLBERG OSCAR	--
SB01700319DDBC2	001	C	31.0	4.00	03-29-73	DALHBERG IS LODGE	--
SB01700320ACDD1	006	H	74.	--	09-19-77	STRINGFELLOW SCOTT	SECTION 20 LOTS
						--	GOVT LOTS
SB01700320CADA1	001	P	65.0	--	05-01-71	AK DIV PKS BIG LK 1	--
SB01700320CCCC1	005	H	28.0	3.00	01-11-74	RODRIQUEZ	--
SB01700320CDAC1	003	H	55.0	13.00	02-11-71	RAINEY CARROL	--
SB01700320CDAC2	003	H	33.0	3.00	05-31-73	GALLANT FRED	--
SB01700320CDAC3	003	H	37.0	6.00	05-25-73	SILL ART	--
SB01700320CDDB1	002	C	37.0	--	01-01-57	SHIP AHOY	--
SB01700320CDDB1002 20376		-	37	--	--	--	--
SB01700320CDDB2	002	C	108	--	11-01-66	KETCHUMS RESORT	FEULNER1968 OFR
SB01700320CDDB3	002	H	30.0	5.00	09-10-76	FIEDLER WILTON R	--
SB01700320DDDA1	004	C	31.0	--	01-01-66	BIG LAKE SUMMR CP	FEULNER1968 OFR
SB01700320DDDA2	004	C	47.0	--	01-01-63	ISLAND LODGE	--
SB01700321ABDA1	005	H	14.0	--	--	ROCCA CLAYTON	WSP1494
SB01700321ACDA1	008	H	65.4	17.	06- -85	VREM TRACY&LINDA	ROCKY LK SUB
						--	LAS
SB01700321ADCB1	004	C	36.0	--	01-01-60	BIG Y GROCERY	FEULNER1968 OFR
SB01700321CDCA1	002	H	53.	--	02-16-76	KOWALSKI ALVES&BETTY	HERMAN SUB
						--	LAS
SB01700321CDDC1	003	H	8.0	--	01-01-50	HERMANS PLACE	WSP1494
SB01700328AABB1	009	P	160	-20.00	05-31-78	BIG LAKE ELEM MAT-SU	--
SB01700328ABAA1	012	H	75.	--	10-25-83	PUNCHES LAWRENCE&FLO	BUTLER SUB AD02
						--	LAS
SB01700328ABBC1	014	H	60.	5.	11-03-84	STALLONE JOHN&BARBAR	BUTLER SUB AD03
						--	LAS
SB01700328ABDB1	008	H	74.0	15.00	06-30-75	WINCHESTER MIKE	BUTLER SUB AD03
SB01700328ACAA1	007	-	--	--	--	BIG LAKE SCHOOL	--
SB01700328ACBC1	002	H	50.	16.	05-24-85	OLENDORF ED	FISH CREEK ADD1
						OLENDORF AMY&LEO	LAS
SB01700328ACCB1	006	H	16.0	--	--	ANDERSON OSCAR	WSP1494
SB01700328ADAC1	013	H	75.	20.	11-01-85	FOSS AIR AK&FOSS JAM	HOBSON SUB
SB01700328ADAC1	013	H	75.	20.	11-01-85	FOSS JAMES&FOSS AIR	BIG LK AIRPORT
						--	LAS
SB01700328BABA1	004	P	29.0	--	01-01-61	BIG LAKE LODGE	FEULNER1968 OFR
SB01700328BACD1	010	H	82.3	-2.00	10-25-79	SANDERS JAMES G	GOTHBERG SUB
SB01700328BCDC1	001	-	14.0	--	--	RUDY SARAH	--
SB01700328BDBB1	005	H	99.5	22.00	05-05-75	PACK BILL	--
SB01700328DBBB1	003	-	14.0	--	07-01-67	SUNSET TRLR PRK	FEULNER1968 OFR
SB01700329AAAB1	001	H	--	--	07-14-67	DAVIS W K	--
SB01700329AABA1	009	C	60.0	41.00	01-01-64	BURKESHORE MARINA M	FEULNER1968 OFR
SB01700329ABAD1	005	H	30.0	8.00	01-01-71	PUHL RAY	--
SB01700329ABBA1	019	H	89.6	--	06-03-77	PUHL RAYMOND	BURKE SHORE SUB
						--	LAS
SB01700329ABBB1	010	H	61.	7.	06-10-88	CORYELL MARSHALL	BURKE SHORE SUB
SB01700329ABDB1	007	H	74.0	--	01-01-71	WINCHESTER RAY	--
SB01700329BAAA1	014	H	67.0	15.00	07-11-59	BAKER	BURKE SHORE SUB

BIG LAKE - 3 MILE RADIUS

LOCAL WELL NUMBER		PRIMARY USE OF WATER	DEPTH OF WELL (FEET)	WATER LEVEL (FEET)	DATE WELL CONSTRUCTED	OWNER	ASSIGNOR OF OTHER IDENTIFIER
SB01700329BAAA2	014	H	101.	31.	06-08-88	SOULES GENE	BURKE SHORE SUB
SB01700329BACD1	018	H	101	--	06-22-78	MOSBY WILBRT & ANN	BIG LAKE SUB
SB01700329BBBC1	011	H	50.4	20.00	02-22-71	OAKES NATHAN	--
SB01700329CACD1	008	H	78.0	4.00	--	PETERSEN LESTER	--
SB01700329CBBD1	016	H	35.0	10.00	01-04-74	HELMS JACK	SPLINTER ADD
SB01700329CBBD2	016	H	119	20.00	08-14-78	HELMS JACK	SPLINTER ADD
SB01700329DBCB1	003	H	80.	--	- -83	BROWN GREGORY&JUANIT --	A.A.FARMER LAS
SB01700329DBDC1	015	C	14.0	--	--	PAYTONS POINT	WSP1494
SB01700329DCBB1	013	H	65.0	3.00	06-10-75	HOLT BOB	HOLT
SB01700329DCBC1	006	H	67.0	4.00	06-11-75	PHILLIPS GLEN	--
SB01700329DCCD1	017	H	47.0	--	09-03-77	LESTER JOSEPH L	--
SB01700329DCDD1	004	P	100	--	01-01-70	AK DIV PKS BIG LAKE	--
SB01700329DDAB1	002	H	50.	10.	06-08-79	BRINGMANN GEORGE --	HIBBARD ADD EXT LAS
SB01700329DDDC1	012	H	98.6	18.00	06-28-76	SMITH MARVIN	--
SB01700330AABA1	003	H	28.0	6.00	01-14-75	FARR DAN	--
SB01700330DAAA1	007	H	52.	5.	02-12-79	EASTBERG ED&CAROL J --	LEWIS SUB LAS
SB01700330DAAD1	005	H	45.0	18.00	01-02-74	LAAK WILLIAM	STARBOARD COVE
SB01700330DBAB1	004	H	75.0	40.00	12-14-73	SHUPE MIKE	STARBOARD COVE
SB01700330DBDB1	001	H	42.0	13.00	06-29-76	WINCHESTER RAY	STARBOARD COVE
SB01700330DCAC1	002	H	38.4	15.00	06-30-76	LANZ JIM	STARBOARD COVE
SB01700330DCCD1	008	H	180.	150.	06-18-86	KREWETZKI HORST --	STARBOARD COVE LAS

LOCAL WELL NUMBER		PRIMARY USE OF WATER	DEPTH OF WELL (FEET)	WATER LEVEL (FEET)	DATE WELL CONSTRUCTED	OWNER	ASSIGNOR OF OTHER IDENTIFIER
SB01700330DDAD1	006	H	183	80.00	05-22-76	COOK WALTER	STARBOARD COVE
SB01700331BADA1	001	C	42.0	--	01-01-66	BIG LAKE YCHT CLB	FEULNER1968 OFR
SB01700333ACBC1	005	H	93.	22.	10-17-70	KLOUDA JOE&PAT --	ECHO LAKE PARK LAS
SB01700333ACCB1	003	H	32.0	20.25	06-22-72	RAPP DICK	ECHO LAKE PARK
SB01700333BBBD1	001	H	115	--	01-01-70	KRULL MARION	--
SB01700333BBCA1	002	H	80.0	40.00	06-01-76	WILDE LAWRENCE	ECHO HILLS SUB
SB01700333BCBD1	004	H	63.	36.	10-03-81	HANSEN ROGER	ECHO HILLS SUB
SB01700333CBAB1	006	H	94.	30.	06-10-86	NECRASON CONRAD&MYRL --	SECTION 33 LOTS LAS
SB01700412DCAB1	001	H	30.0	--	01-01-54	CAMPBELL HOWARD	--
SB01700414ABAB1	001	H	30.0	15.00	06-28-76	KORMAN DARRELL	--
SB01700414ABAB2	001	H	60.0	10.00	07-23-78	PETERSON HANK	--
SB01700414ACAB1	003	H	61.	12.	06-10-86	JOHNS MARIE&ROBERT	HORSESHOE LAKE
SB01700414ADCB1	002	H	67.0	7.00	03-26-83	GIST PERCY	BYRNE SUB
SB01700426ABDB1	004	H	50.0	20.00	09-19-78	GRANUS WALTER	DAVIS SUB
SB01700426ABDB2	004	H	36.0	--	06-03-80	GATES HERB.& KATH.	DAVIS SUB
SB01700426ADAA1	002	H	52.0	30.00	05-25-76	FRIDLEY DAVE	DAVIS SUB
SB01700426CAAD1	001	H	34.0	24.00	05-01-73	UNREIN JOHN	--
SB01700427DABC1	001	C	40.0	--	--	CALL OF WILD CP	--
SB01700435ACCD1	001	H	87.0	16.00	03-24-71	HOYT HARRY	--
SB01700435CDDD1	002	H	24.0	13.00	07-01-75	MCINTIRE BETTY	KUKOWSKI SUB

LOCAL WELL NUMBER		PRIMARY USE OF WATER	DEPTH OF WELL (FEET)	WATER LEVEL (FEET)	DATE WELL CONSTRUCTED	OWNER	ASSIGNOR OF OTHER IDENTIFIER
SB01700308DACC1	003	H	50.0	19.00	12-01-81	MIKKELSON DON&LARSON	FREEMAN SUB
						--	LAS
SB01700308DADC1	004	H	50.0	30.00	09-12-75	BAKEN RUS & ELLEN	FREEMAN SUB
						WARDLOW R	LAS
SB01700308DDAB1	005	H	44.0	22.00	06-04-79	NEWTON TOM	FREEMAN SUB 1
						--	LAS
SB01700308DDAC1	006	H	60.0	5.00	05-01-81	MIKKELSON DON	FREEMAN SUB 1
						--	LAS
SB01700309CCBA1	001	H	55.0	10.00	06-11-75	CUMMINS JOHN	--
SB01700309CCDC1	007	H	100.	--	- -73	PHILLIPS FRED	BEAVER LKS P.AD
						PATRICK BILL	--
						ROMAN O'MARY	--
SB01700309CDCC1	004	T	58.0	--	01-01-66	WASILLA ASSM GOD	--
SB01700316CDCA1	002	H	53.0	--	--	NERLAND JERRY	ROCKY LK ALASKA
SB01700316DBBB1	003	H	54.0	14.00	10-13-76	ADF&G MEADW CK	--
SB01700316DBBB2	003	T	30.0	9.00	11-18-76	ADF&G MEADW CK	--
SB01700316DBBB3	003	T	31.0	--	--	ADF&G MEADW CK	--
SB01700316DBBB4	003	Q	28.0	7.40	02-16-78	ADF&G MEADOW CK	MAT-SU ASSES NO
						--	BG LK HATCHERY
SB01700316DBBB5	003	Q	20.5	8.00	02-16-78	ADF&G MEADOW CK	MAT-SU ASSES NO
						--	BG LK HATCHERY
SB01700316DBBB6	003	Q	182	--	09-07-78	ADF&G MEADOW CK	BG LK HATCHERY
SB01700316DBBB7	003	Q	27.0	7.00	03-08-78	ADF&G MEADOW CK	BG LK HATCHERY
SB01700316DBBB8	003	Q	176.8	-4.	12-07-84	ADF&G MEADOW CK	SECTION 16 LOTS
						--	BG LK HATCHERY
						--	LAS
SB01700316DDCC1	001	P	62.0	--	05-14-71	AK DIV PKS ROCKY LK	--
SB01700319DCAB1	004	H	65.	4.5	03-29-83	DUCLOS PAUL&SARA	FARR SUB
						--	LAS
SB01700319DCAC1	002	H	30.0	2.00	03-21-73	ERICKSON EDWIN	--
SB01700319DCDA1	003	H	52.0	5.00	03-26-73	PEDERSON HARRY	--
SB01700319DDBC1	001	H	26.0	3.00	12-12-73	DAHLBERG OSCAR	--
SB01700319DDBC2	001	C	31.0	4.00	03-29-73	DALHBERG IS LODGE	--
SB01700320ACDD1	006	H	74.	--	09-19-77	STRINGPELLOW SCOTT	SECTION 20 LOTS
						--	GOVT LOTS
SB01700320CADA1	001	P	65.0	--	05-01-71	AK DIV PKS BIG LK 1	--
SB01700320CCCC1	005	H	28.0	3.00	01-11-74	RODRIQUEZ	--
SB01700320CDAC1	003	H	55.0	13.00	02-11-71	RAINEY CARROL	--
SB01700320CDAC2	003	H	33.0	3.00	05-31-73	GALLANT FRED	--
SB01700320CDAC3	003	H	37.0	6.00	05-25-73	SILL ART	--
SB01700320CDDB1	002	C	37.0	--	01-01-57	SHIP AHOY	--
SB01700320CDDB1002 20376		-	37	--	--	--	--
SB01700320CDDB2	002	C	108	--	11-01-66	KETCHUMS RESORT	PEULNER1968 OFR
SB01700320CDDB3	002	H	30.0	5.00	09-10-76	FIEDLER WILTON R	--
SB01700320DDDA1	004	C	31.0	--	01-01-66	BIG LAKE SUMMR CP	PEULNER1968 OFR
SB01700320DDDA2	004	C	47.0	--	01-01-63	ISLAND LODGE	--
SB01700321AABC1	007	H	28.0	15.00	06-16-76	STARKEY TED	ROCKY LK SUB 3
SB01700321ABDA1	005	H	14.0	--	--	ROCCA CLAYTON	WSP1494
SB01700321ACDA1	008	H	65.4	17.	06- -85	VREM TRACY&LINDA	ROCKY LK SUB
						--	LAS
SB01700321ADBC1	001	C	28.0	13.80	04-01-70	FISHER ROBERT	--
SB01700321ADBD1	006	C	29.0	16.00	06-14-76	FISHER ROBERT	--
SB01700321ADCB1	004	C	36.0	--	01-01-60	BIG Y GROCERY	PEULNER1968 OFR
SB01700321CDCA1	002	H	53.	--	02-16-76	KOWALSKI ALVES&BETTY	HERMAN SUB
						--	LAS
SB01700321CDDC1	003	H	8.0	--	01-01-50	HERMANS PLACE	WSP1494
SB01700322CCBB1	002	-	27.0	18.00	06-02-73	MARTINES	--
SB01700322CCBD1	005	H	106	-5.00	07-26-83	SCHNELL LAVRENCE	MORGANS BLUFF
						CROSS CREEK INC	--
SB01700327BBBC1	001	H	190	54.00	07-26-83	HOLDEN EVERETT	PLITE SIDE SUB
SB01700328AABB1	009	P	160	-20.00	05-31-78	BIG LAKE ELEM MAT-SU	--
SB01700328ABAA1	012	H	75.	--	10-25-83	PUNCHES LAWRENCE&PLO	BUTLER SUB AD02
						--	LAS
SB01700328ABBC1	014	H	60.	5.	11-03-84	STALLONE JOHN&BARBAR	BUTLER SUB AD03
						--	LAS

BIG LAKE LOCALE - 2 MILE RADIUS

LOCAL WELL NUMBER		PRIMARY USE OF WATER	DEPTH OF WELL (FEET)	WATER LEVEL (FEET)	DATE WELL CONSTRUCTED	OWNER	ASSIGNOR OF OTHER IDENTIFIER
SB01700329ABAD1	005	H	30.0	8.00	01-01-71	PUHL RAY	--
SB01700329ABBA1	019	H	89.6	--	06-03-77	PUHL RAYMOND	BURKE SHORE SUB
						--	LAS
SB01700329ABBB1	010	H	61.	7.	06-10-88	CORYELL MARSHALL	BURKE SHORE SUB
SB01700329ABDB1	007	H	74.0	--	01-01-71	WINCHESTER RAY	--
SB01700329BAAA1	014	H	67.0	15.00	07-11-59	BAKER	BURKE SHORE SUB
SB01700329BAAA2	014	H	101.	31.	06-08-88	SOULES GENE	BURKE SHORE SUB
SB01700329BACD1	018	H	101	--	06-22-78	MOSBY WILBRT & ANN	BIG LAKE SUB
SB01700329BBBC1	011	H	50.4	20.00	02-22-71	OAKES NATHAN	--
SB01700329CACD1	008	H	78.0	4.00	--	PETERSEN LESTER	--
SB01700329CBBD1	016	H	35.0	10.00	01-04-74	HELMS JACK	SPLINTER ADD
SB01700329CBBD2	016	H	119	20.00	08-14-78	HELMS JACK	SPLINTER ADD
SB01700329DBCB1	003	H	80.	--	- -83	BROWN GREGORY&JUANIT	A.A.FARMER
SB01700328ABDB1	008	H	74.0	15.00	06-30-75	WINCHESTER MIKE	BUTLER SUB AD03
SB01700328ACAA1	007	-	--	--	--	BIG LAKE SCHOOL	--
SB01700328ACBC1	002	H	50.	16.	05-24-85	OLENDORF ED	FISH CREEK ADD1
						OLENDORF AMY&LEO	LAS
SB01700328ACCB1	006	H	16.0	--	--	ANDERSON OSCAR	WSP1494
SB01700328ADAC1	013	H	75.	20.	11-01-85	FOSS AIR AK&FOSS JAM	HOBSON SUB
						FOSS JAMES&FOSS AIR	BIG LK AIRPORT
						--	LAS
SB01700328BABA1	004	P	29.0	--	01-01-61	BIG LAKE LODGE	FEULNER1968 OFR
SB01700328BACD1	010	H	82.3	-2.00	10-25-79	SANDERS JAMES G	GOTHBERG SUB
SB01700328BCDC1	001	-	14.0	--	--	RUDY SARAH	--
SB01700328BDBB1	005	H	99.5	22.00	05-05-75	PACK BILL	--
SB01700328DBBB1	003	-	14.0	--	07-01-67	SUNSET TRLR PRK	FEULNER1968 OFR
SB01700329AAAB1	001	H	--	--	07-14-67	DAVIS W K	--
SB01700329AABA1	009	C	60.0	41.00	01-01-64	BURKESHORE MARINA M	FEULNER1968 OFR
SB01700329DBDC1	015	C	14.0	--	--	PAYTONS POINT	WSP1494
SB01700329DCBB1	013	H	65.0	3.00	06-10-75	HOLT BOB	HOLT
SB01700329DCBC1	006	H	67.0	4.00	06-11-75	PHILLIPS GLEN	--
SB01700329DCCD1	017	H	47.0	--	09-03-77	LESTER JOSEPH L	--
SB01700329DCDD1	004	P	100	--	01-01-70	AK DIV PKS BIG LAKE	--
SB01700329DDAB1	002	H	50.	10.	06-08-79	BRINGMANN GEORGE	HIBBARD ADD EXT
						--	LAS
SB01700329DDDC1	012	H	98.6	18.00	06-28-76	SMITH MARVIN	--
SB01700330AABA1	003	H	28.0	6.00	01-14-75	FARR DAN	--
SB01700330DAAA1	007	H	52.	5.	02-12-79	EASTBERG ED&CAROL J	LEWIS SUB
						--	LAS
SB01700330DAAD1	005	H	45.0	18.00	01-02-74	LAAK WILLIAM	STARBOARD COVE
SB01700330DBAB1	004	H	75.0	40.00	12-14-73	SHUPE MIKE	STARBOARD COVE
SB01700330DBDB1	001	H	42.0	13.00	06-29-76	WINCHESTER RAY	STARBOARD COVE
SB01700330DCAC1	002	H	38.4	15.00	06-30-76	LANZ JIM	STARBOARD COVE
SB01700330DCCD1	008	H	180.	150.	06-18-86	KREWETZKI HORST	STARBOARD COVE
						--	LAS
SB01700330DDAD1	006	H	183	80.00	05-22-76	COOK WALTER	STARBOARD COVE
SB01700331BADA1	001	C	42.0	--	01-01-66	BIG LAKE YCHT CLB	FEULNER1968 OFR
SB01700333BBBD1	001	H	115	--	01-01-70	KRULL MARION	--
SB01700333BBCA1	002	H	80.0	40.00	06-01-76	WILDE LAWRENCE	ECHO HILLS SUB

Walter Weaver
schoolmaster

Mat. Valley

DRILLERS LOG

Well No. _____

Driller G & G DRILLING CO. - LeeH. Gohr

Date Started July 16, 1956

Owner Walter Weaver

Date completed July 26, 1956

Address Anchorage, Alaska

Use of well Home

Location of well 8 Miles from Wasilla on Big Lake Road

Depth of well 73 feet.

Bottom of casing at 73 feet.

size of casing 6"

Finish (check one) Open end (X). Screen ( ). Perforated ( ).

Describe screen or perforations _____

Static water level 29 feet (above) (below) land surface.

eld (~~flowed~~) (bailed) (~~pumped~~) 600 gallons per (hour) (~~minute~~)

Development (bailed) (~~pumped~~) 600 gallons per(hour) (~~minute~~) for 2 (hours) (~~minutes~~)

with 10 feet of drawdown

Description of formation (describing material, color, whether hard or soft, water bearing, etc.	Thickness of formation	Depth From	Depth To
Top Soil	3	0	3
Clay & Gravel Hard	32	3	35
Blue Clay Soft	23	35	58
Gravel & Some Water	2	58	60
Blue Clay Soft	11	60	71
Water Bearing Gravel	2	71	73

Water Well Log
11-21-58

J. Potter
Well Log

DRILLERS LOG

Driller G & G DRILLING CO -Lee H. Gohr Date started 8/19/58

Well Owner JIM POTTER Date completed 8/21/58

Address BOX 153, Anchorage, Alaska Use of well Home

Location of well(Township, Range & Section, if known or distance from main roads) 2 Miles Right of Pittman

Total depth of drilled well 38 feet

Bottom of casing at 38 feet Size of casing 6"

Finish (Check one) Open end (X) Screen ( ) Perforated ( )

Describe screen or perforations

Well development (bailed) or (XXXXXXX Pumped) 250 gallons per (hour) (XXXXXXX minute) for 3 (hours) (XXXXXXX minutes) with 33 feet of drawdown

Static water level 1 feet (XXXXX above) (below) land surface

Remarks

Description of formation (type of material, hard or soft, water bearing, color etc.)	Thickness	Depth From	Depth to
Top soil & Sand (Brown)	14	0	14
Sand & Pea Gravel (Water Bearing)	5	14	19
Clay with seams of water bearing gravel	19	19	38

K. Lovejoy

DRILLERS LOG

Well No. _____

Driller G & G DRILLING CO. - Lee H. Gohr

Date Started Aug 11, 1958

Owner K. Lovejoy

Date completed Aug. 14, 1958

Address St. Rt. Wassila

Use of well Dairy

Location of well Approx 5 miles past Pittman

Depth of well 35 feet.

Bottom of casing at 35 feet.

size of casing 6" Hvy

Finish (check one). Open end (X). Screen ( ). Perforated ( ).

Describe screen or perforations _____

Static water level 20½ feet (above) (below) land surface.

Yield (flowed) (bailed) (Pumped) 1500 gallons per (hour) (minutes).

Development (bailed) (pumped) 1500 gallons per (Hour) (minute) for 1 (hours) (minutes)

with 3 feet of drawdown.

Description of formation (describing material, color, whether hard or soft, water bearing, etc.	Thickness of formation	Depth From	Depth To
Top Soil	1	0	1
Sand & Gravel	26	1	27
Water bearing Sand & Gravel	8	27	35
(Didnot go to bottom of sand & gravel)			
L. Gohr			
	Schedule		

(continued)

J. C. Harris

DRILLERS LOG

Driller G & G DRILLING CO. Lee H. Gohr Date started 8-15-58

Well Owner J. C. Harris Date completed 8-17-58

Address One Mile from Pittman Big Lake Rd Use of well Home

Location of well(Township, Range & Section, if known or distance from main roads)

Total depth of drilled well 43 feet

Bottom of casing at 43 feet Size of casing 6"

Finish (Check one) Open end (x) Screen ( ) Perforated ( )

Describe screen or perforations

Well development (bailed) or (~~Pumped~~) 1200 gallons per (hour) (~~minute~~) for 1 (hours) (~~minutes~~) with 10 feet of drawdown

Static water level 16 feet (~~above~~) (below) land surface

Remarks Sand & Pea gravel heaves in pipe 28 to 40 ft

Description of formation (type of material, hard or soft, water bearing, color, etc.)	Thickness	Depth From	Depth to
Top soil	1	0	1
Sand & Gravel	20	1	21
Water bearing sand & gravel	7	21	28
Water bearing sand (Fine)	10	28	38
Pea Gravel	2	38	40
Large ~~Sand & Gra~~ Gravel & Sand	3	40	43
Didnot go to bottom of stream			

Houston Sheet 12

M-W DRILLING, Inc.
P. O. Box 4-1728 • 2811 Dawson
A C 907-279-1741
ANCHORAGE, ALASKA 99509

DRILLING LOG

Well Owner Greet Plains (American) Inc. Use of Well Com.

Location (address of: Township, Range, Section, if known; or distance main road
Horshoe Lake, Gr Plains ~~XXX~~ Noel State # 1, Well Site
Big Lake Area

Size of casing 6 Depth of Hole 93 feet Cased to 93 feet

Static water level 7 ft. ~~(XXX~~ (above) (below) land surface. Finish of well (check one) open end (X);
Screen ( ); Perforated ( ).

Describe screen or perforation None

Well pumping test at 60 gallons per ~~(XXX~~ (hour) (minute) for 1-2 hours with 100% ft. of drawdown from static level.

Date of completion 3 Mar 73

LETTER

PICK UP

WELL LOG

Depth in feet from ground surface		Give details of formations penetrated, size of material, color and hardness
0	TO 20	Sandy Brown Gravel
20	TO 40	Fine Grey Sand
40	TO 45	Sand: Grey, wet--static level 15'
45	TO 80	Sand: a/a
80	TO 90	Medium to coarse Gravel: slightly sandy, good water--20 GPM.
90	TO 94	Coarse Gravel: excellent water 60 GPM.
	TO	
	TO	
	TO	
	TO	
	TO	
	TO	
	TO	
	TO	
	TO	

Wayne E. Westberg

Ed. L. Ingram

Area 13/4
(For use by USGS)

DRILLERS LOG sched made Mat Valley

Owner Ed L. Ingram Use of well Home & Business

Location (Address of; Township, Range & Section if known; or distance from main roads) Big Lake Y.

Drilled by Clarence Foss Address 3401 Spenard Road Swafford Drilling Co.

Date completed 7-14-59 Total depth of drilled hole 33 ft.

Bottom of casing at 32 feet Size of casing 6"

Finish (Check one) Open end(X) Screen ( ) Perforated ( )

Describe screen or perforations

Well developed by (bailing)(pumping) 5 gallons per (hour)(minute)

for 2 (hours)(minutes) with 10 feet of drawdown

Static water level 20 feet (above)(below) land surface

Remarks Pumped full capacity of well from 30 ft.

Description of formation (Type of material, color, hardness, water bearing, etc.)	Thickness	Depth
Sand and Clay (Brown)	15	0-15
Clay(Blue) and Gravel	15	15-30
Sand w/H^2O at 30 feet.	3	30-33

WATER WELL DRILLERS LOG

DO NOT FILL IN

Drilling Co. Moffitt

USGS No.

Driller

Area

Well Owner Adolph Martens Use of Well

Location (address of: Township, Range, & Section (if known); distance from road:

Big Lake Bx. 4620 Anch. 99503

Size of Casing 6 Depth of Hole 30 feet. Cased to 30 feet.

Static water level 18 feet (above) (below) land surface. Finish of well

(check one) Open end (✓): Screen ( ): Perforated ( ).

Describe screen or perforations:

Well pumping test at 5-7 gallons per ~~(hr)~~ (min) for _____ hours with _____ feet of drawdown from static level.

Remarks

6-5-73

WELL LOG

Depth in feet from ground surface		Give details of formations penetrated, size of material, color, and hardness.
0	to 1	topsoil
1	to 10	gravel
10	to 11	sand
11	to 17	gravel
17	to 20	sand
20	to 24	gravel
24	to 29	sand & gravel
29	to 30	gravel
	to	
	to	
	to	
	to	
	to	
	to	
	to	
	to	

S.G.S. Certified

Horton McLellan

Area MAT Valley

(For USGS use only)

Sched made

DRILLERS LOG

Well Owner Horton McClellan Use of well

Location (Address of; Township, Range & Section, if known; or distance from main road)

Big Lake, Alaska, Mail Box, 725 Ch. Rt A

Spenard, Ala.

Drilling Co. ~~10/3/1959~~ Swafford Driller Wayne Dotte

Date completed 10/3/1959 Total depth of drill hole 145'

Bottom of casing at 145' feet Size of casing 6"

Finish (Check one) Open end (X); Screen ( ); Perforated ( )

Describe screen or perforations

Well developed by (bailing) (pumping) 8 gallons per (hour) (minute) for

1½ (hours) (minutes) with 27' feet of drawdown.

Static water level 50 feet (above) (below) land surface.

Remarks

Description of formation (Type and size of material, color, hardness, water-bearing, etc.)	Thickness	Depth
Hardpan	21'	0-2
Hard pan with ½ g PM from 21-26	25'	21-4
silty sand	8'	46-5
dry coarse gravel	1'	54-5
dry silty sand	19'	55-7
Hard pan	1½	74-7
Hard pan, light grey		75½-1
dry except for water at 90½ g.p.m.		
Dark grey hard pan, make little water		134-1
Vein in hard pan		145

WATER WELL DRILLERS LOG

DO NOT FILL IN

Drilling Co. Moffitt

USGS No.

Driller

Area

Well Owner Vic Spangle

Use of Well

Location (address of: Township, Range, & Section (if known); distance from road:

Big Lake Area (3900 Bleker Dr. Anch. 277-2879

Size of Casing 6 Depth of Hole 44 feet. Cased to 44 feet.

Static water level feet (above) (below) land surface. Finish of well

(check one) Open end (X): Screen ( ): Perforated ( ).

Describe screen or perforations:

Well pumping test at 10 gallons per ~~(hr)~~ (min) for hours with feet of drawdown from static level.

Remarks

2-19-71

WELL LOG

Depth in feet from ground surface	Give details of formations penetrated, size of material, color, and hardness.
0 to 12	gravel
12 to 17	hardpan
17 to 22	sand
22 to 24	hardpan
24 to 42	sand
42 to 43	hardpan
43 to 44	gravel
___ to ___	
___ to ___	
___ to ___	
___ to ___	
___ to ___	
___ to ___	
___ to ___	
___ to ___	
___ to ___	

C. E. Strom
Mat Valley
Sched made

DRILLERS LOG

Driller Clarence Foss Swafford Drilling Company Date started 7-21-59

Owner Charles E. Strom Date completed 7-25-59

Address 604 Manor Ave.--Gov'mt. Hill Use of well Home

Location of well (Township, Range & Section, if known or distance from main roads) Section 33--T17N--R3W---Echo Lake---Big Lake Area.

Total depth of drilled well 87 feet

Bottom of casing at 87 feet Size of casing 6"

Finish (Check one) Open end (X) Screen ( ) Perforated ( )

Describe screen or perforations

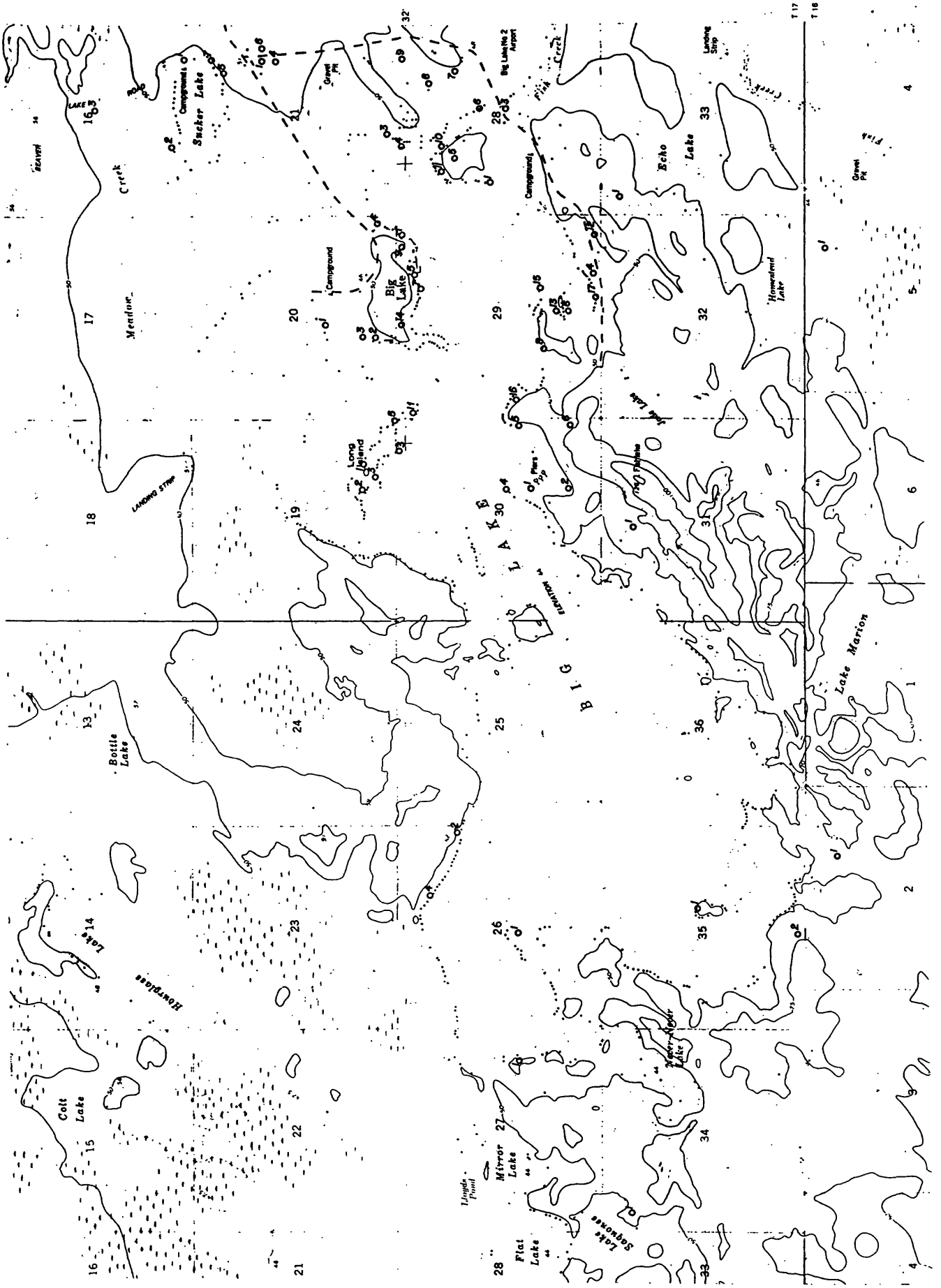
Well development (bailed) or (Pumped) 9 gallons per (hour) (minute) for 4 (hours) (minutes) with 60 feet of drawdown

Static water level 15 feet (above) (below) land surface

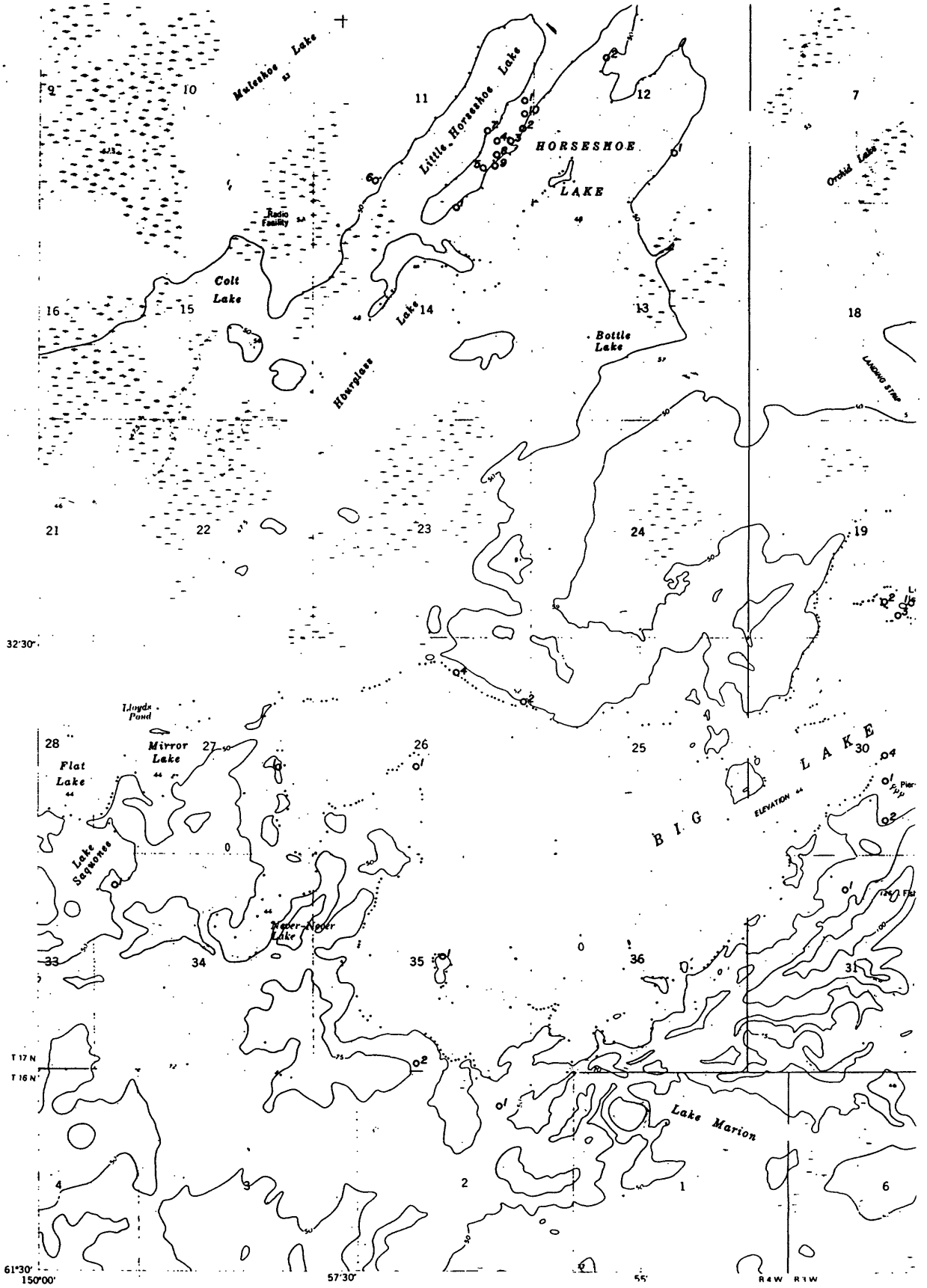
Remarks Used 89 3/4 ft. Casing. Pump at 30 ft. for 3 hrs. and water would not clear up.

Description of formation (type of material, hard or soft, water bearing, color, etc.)	Thickness	Depth From	Depth to
Clay (Brown) and Rocks	14	0	14
Clay (Blue) w/ Sand and Gravel	14	14	28
Clay and Gravel (Dirty) w/H_2O-11 G.P.M.	3	28	31
Clay (Blue) w/ Sand and Gravel	6	31	37
Clay (Blue)	4	37	41
Clay w/Sand and Gravel	27	41	68
Hard-pan	16	68	84
Gravel w/H_2O	3	84	87

(continue log on reverse side)



This figure corresponds with the following table(s).



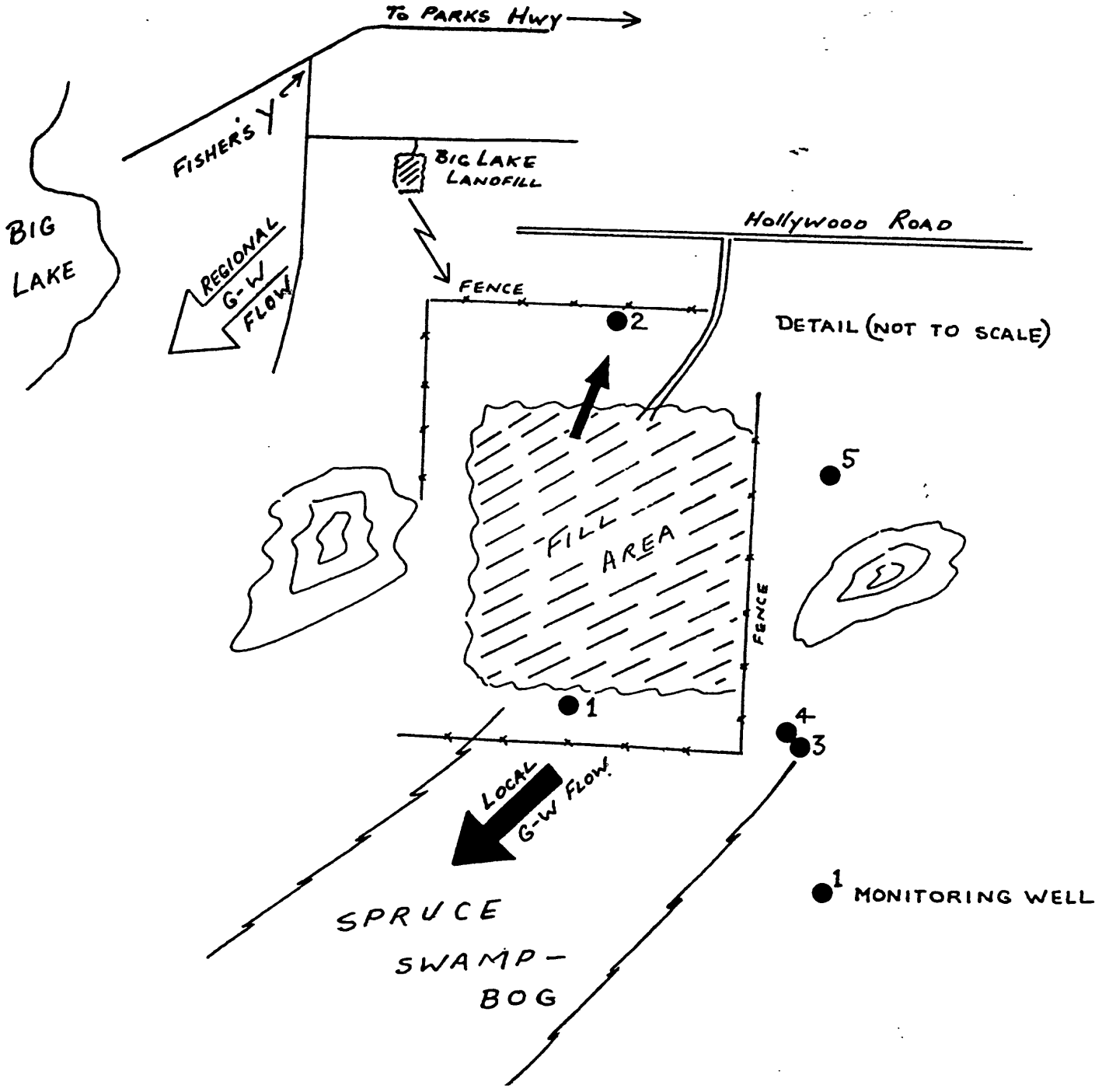
This figure corresponds with the following table(s).

Well No. T. R. Sec.*	Map No.	Driller	Date drilled	Well depth (ft)	Water level (ft)	Well yield (gpm)	Use	Owner's name Last	First
SB 16 3 5 ABAD1	1	TRI-CITY DRL	10-22-60	3215			U	UNION OIL	BIG LAKE
SB 16 4 2 ABCB1	1	TRI-CITY DRL	10-06-60	3005			U	UNION OIL	
SB 17 3 4 CCDC1	1	OWNER	01-01-66	17	6		H	FOSSBERG	ELDRIDGE
SB 17 3 4 DABC1	3	HARTNER DRL	09-17-76	88	25	10	H	VERMILYEA	SCOTT
SB 17 3 4 DDCB1	2	MOFFITT DRL	05-26-70	39	36	10	H	DENNIS	JACK
SB 17 3 8 DABB1	1	O&E DRILLING	10-30-76	54	24	10	H	MCDANIEL	JAY&BARB
SB 17 3 9 BBBB1	2	PATRICK	01-01-74	42	17	15	H	ELLIS	RALPH
SB 17 3 9 BBDB1	3	LARSON L	01-01-64	56	26		H	NORMAN	LEONARD
SB 17 3 9 CCBA1	1	M-W DRILLING	06-11-75	55	10	5	H	CUMMINS	JOHN
SB 17 3 9 CDCC1	4	G&G DRILLING	01-01-66	58	41	20	T	WASILLA	ASSM GOD
SB 17 3 16 CDCA1	2	G&G DRILLING		53	6	10	H	NERLAND	JERRY
SB 17 3 16 DBBB1	3	WESTN STATES	10-13-76	54	14	75	H	ADF&G	MEADW CK
SB 17 3 16 DBBB2	3	WESTN STATES	11-18-76	30	9		T	ADF&G	MEADW CK
SB 17 3 16 DBBB3	3	WESTN STATES		31	9		T	ADF&G	MEADW CK
SB 17 3 16 DDCC1	1	HATCH DRL	05-14-71	62	5	10	P	AK DIV PKS	ROCKY LK
SB 17 3 19 DCAC1	2	MOFFITT DRL	03-21-73	30	2	10	H	ERICKSON	EDWIN
SB 17 3 19 DCDA1	3	MITCHELL DRL	03-26-73	52	5	20	H	PEDERSON	HARRY
SB 17 3 19 DDBC1	1	MOFFITT DRL	12-12-73	26	3	4	H	DAHLBERG	OSCAR
SB 17 3 19 DDBC2	1	MOFFITT DRL	03-29-73	31	4	5	C	DAHLBERG	IS LODGE
SB 17 3 20 CADA1	1	UNKNOWN	05-01-71	65	5	10	P	AK DIV PKS	BIG LK 1
SB 17 3 20 CCCC1	5	MOFFITT DRL	01-11-74	28	3	4	H	RODRIQUES	JACK
SB 17 3 20 CDAC1	3	MOFFITT DRL	02-11-71	55	13	8	H	RAINEY	CARROL
SB 17 3 20 CDAC2	3	MITCHELL DRL	05-31-73	33	3	7	H	GALLANT	FRED
SB 17 3 20 CDAC3	3	MITCHELL DRL	05-25-73	37	6		H	SILL	ART
SB 17 3 20 CDDB1	2	UNKNOWN	01-01-57	37			C	SHIP	AHOY
SB 17 3 20 CODB2	2	BERGSTEDT	11-01-66	108		80	C	KETCHUMS	RESORT
SB 17 3 20 CDDB3	2	MCKAY DRL	09-10-76	30	5	20	H	FIEDLER	WILTON
SB 17 3 20 DDDA1	4	OWNER	01-01-66	31		5	C	BIG LAKE	SUMMER CP
SB 17 3 20 DDDA2	4	UNKNOWN	01-01-63	47			C	ISLAND	LODGE
SB 17 3 21 AABC1	7	HARTNER DRL	06-16-76	28	15	10	H	STARKEY	TED
SB 17 3 21 ABDA1	5	OWNER		14			H	ROCCA	CLAYTON
SB 17 3 21 ADBC1	1	L&M DRILLING	04-01-70	28	14	25	C	FISHER	ROBERT
SB 17 3 21 AOBO1	6	HARTNER DRL	06-14-76	29	16	10	C	FISHER	ROBERT
SB 17 3 21 ADCB1	4	SWAFFORD DRL	01-01-60	36			C	BIG Y	GROCERY
SB 17 3 21 CDDC1	3	OWNER	01-01-50	8	7		H	HERMANS	PLACE
SB 17 3 28 AABB1	9	WESTN STATES	05-31-78	160	-20	50	P	MAT-SU BOR	BIG LAKE
SB 17 3 28 ABDB1	8	M-W DRILLING	06-30-75	74	15	8	H	WINCHESTER	MIKE
SB 17 3 28 ACCB1	6	OWNER		16	14		H	ANDERSON	OSCAR
SB 17 3 28 BABA1	4	UNITED GEOPH	01-01-61	29	9	200	P	BIG LAKE	LODGE
SB 17 3 28 BACD1	10	M-W DRILLING	10-25-79	82	-2		H	SANDERS	JAMES
SB 17 3 28 BBDD1	11	M-W DRILLING	08-09-78	38	10	15	H	CLEMENSON	VIRGIL
SB 17 3 28 BCDC1	1	UNKNOWN		14	3			RUDY	SARAH
SB 17 3 28 BDBB1	5	PALMER RON	05-05-75	100	22	5	H	PACK	BILL
SB 17 3 28 DBBB1	3	HUBER JOHN	07-01-67	14	7			SUNSET	TRLR PRK
SB 17 3 29 AAAB1	1	UNKNOWN	07-14-67			4	H	DAVIS	W
SB 17 3 29 AABA1	9	SMITH	01-01-64	60	41		C	BURKESHORE	MARINA
SB 17 3 29 ABAD1	5	G&G DRILLING	01-01-71	30	8	13	H	PUHL	RAY
SB 17 3 29 ABDB1	7	G&G DRILLING	01-01-71	74	6	5	H	WINCHESTER	RAY
SB 17 3 29 BAAA1	14	SWAFFORD DRL	07-11-59	67	15	10	H	BAKER	
SB 17 3 29 BBBC1	11	MOFFITT DRL	02-22-71	50	20	5	H	OAKES	NATHAN
SB 17 3 29 CACD1	8	G&G DRILLING		78	4	10	H	PETERSEN	LESTER
SB 17 3 29 CBBD1	16	M-W DRILLING	01-04-74	35	10	30	H	HELMS	JACK
SB 17 3 29 CBBD2	16	M-W DRILLING	08-14-78	119	20	10	H	HELMS	JACK
SB 17 3 29 DBDC1	15	UNKNOWN		14	3		C	PAYTONS	POINT
SB 17 3 29 DCBB1	13	M-W DRILLING	06-10-75	65	3	50	H	HOLT	BOB
SB 17 3 29 DCBC1	6	M-W DRILLING	06-11-75	67	4	12	H	PHILLIPS	GLEN
SB 17 3 29 DCCD1	17	TEAL HOWARD	09-03-77	47		10	H	LESTER	JOSEPH
SB 17 3 29 DCOD1	4	HATCH DRL	01-01-70	100	35	8	P	AK DIV PKS	BIG LAKE
SB 17 3 29 DDOC1	12	M-W DRILLING	06-28-76	99	18	20	H	SMITH	MARVIN
SB 17 3 30 AABA1	3	MITCHELL DRL	01-14-75	28	6	5	H	FARR	DAN
SB 17 3 30 AADA1	5	M-W DRILLING	01-02-74	45	18	15	H	LAAK	WILLIAM
SB 17 3 30 DBAB1	4	M-W DRILLING	12-14-73	75	40	10	H	SHUPE	MIKE
SB 17 3 30 DBDB1	1	M-W DRILLING	06-29-76	42	13	8	H	WINCHESTER	RAY
SB 17 3 30 DCAC1	2	MAT-SU DRL	06-30-76	39	15	8	H	LANZ	JIM
SB 17 3 30 DDAD1	6	M-W DRILLING	05-22-76	183	80	54	H	COOK	WALTER
SB 17 3 31 BADA1	6	UNKNOWN	01-01-66	42			C	BIG LAKE	YCHT CLB
SB 17 3 33 BBBD1	1	G&G DRILLING	01-01-70	115		5	H	KRULL	MARION
SB 17 4 1 DCBB1	1	RB MNTGOMERY	05-15-73	8230			U	GREAT PLNS	DEVELP
SB 17 4 11 CDCB1	6	D&E DRILLING	03-01-76	54	6	18	H	LIDELL	ERIC
SB 17 4 11 DAAA1	1	OWNER	01-01-65	15	9		H	MASON	WILL
SB 17 4 11 DAAD1	10	KENS COMPANY	06-19-78	57	10	14	H	HANNON	GORDON
SB 17 4 11 OACB1	7	KENS COMPANY	07-17-78	61		15	H	REESE	BILL
SB 17 4 11 DACD1	4	MCKAY DRL	08-14-76	54	8	12	H	MASON	WILLIAM
SB 17 4 11 DADA1	2	OWNER	01-01-64	30			H	MORTON	
SB 17 4 11 DADA2	2	KENS COMPANY	07-21-78	59		14	H	ALVORO	BOB
SB 17 4 11 DADC1	3	OWNER	01-01-72	25			H	WRIGHT	NEIL
SB 17 4 11 DADC2	3	KENS COMPANY	06-19-78	66	12	21	H	WILSON	TED
SB 17 4 11 ODBA1	8	KENS COMPANY	06-19-78	64	10	20	H	ORTIZ	MAX
SB 17 4 11 DDBC1	5	MCKAY DRL	08-09-76	90	12	40	H	HARDISTY	ROBERT
SB 17 4 11 DDBO1	9	KENS COMPANY	02-03-79	62	12	14	H	PIPPEL	BOB
SB 17 4 12 BDBD1	2	MOFFITT DRL	01-17-74	41	4	10	H	GURONDALE	
SB 17 4 12 DCAB1	1	OWNER	01-01-54	30	7		H	CAMPBELL	HOWARD
SB 17 4 14 ABAB1	1	HARTNER DRL	06-28-76	30	15	10	H	KORMAN	DARRELL
SB 17 4 14 ABAB2	1	KENS COMPANY	07-23-78	60	10	14	H	PETERSON	HANK
SB 17 4 26 ABDB1	4	HARTNER DRL	09-19-78	50	20	20	H	GRANUS	WALTER
SB 17 4 26 ADAA1	2	HARTNER DRL	05-25-76	52	30	10	H	FRIOLEY	DAVE
SB 17 4 26 CAAD1	1	PALMER RON	05-01-73	34	24	14	H	UNREIN	JOHN
SB 17 4 27 OABC1	1	UNKNOWN		40			C	CALL OF	WILD CP
SB 17 4 34 BBCA1	1	HARTNER DRL	11-10-76	75	30	10	H	DODGE	GEORGE
SB 17 4 35 ACCD1	1	MOFFITT DRL	03-24-71	87	16	10	H	HOYT	HARRY
SB 17 4 35 CDDD1	2	JENKENS DRL	07-01-75	24	13	15	H	MCINTIRE	BETTY
SB 18 3 32 ABCA1	1	LOVELY LUM	02-09-70	8454			U	LITTLE BR	DEVEL

MAT-SU BOROUGH LANDFILLS

BIG LAKE

Location: T17N, R3W, SW¼ of SE¼, Section 22
USGS map Anchorage (C-8) SE, Scale 1:25,000



This figure corresponds with the following information.

BIG LAKE SITE -- Mat-Su Landfills

Location: SW 1/4 of SE 1/4, Sec 22, T17N, R3W
Anchorage (C-8) SE sheet, scale 1:25,000
Approx 3/4 mile east of paved road around east shore of Big Lake and 3/4 mile NE of Big Lake airport No. 2

General topographic setting: Rolling or hummocky terrain, morainal ridges surrounded by and cut by stream outwash deposits.

Ground-water flow direction: Regional flow direction to southwest and south, toward Big Lake, Fish Creek and ultimately to Knik Arm. Apparent local flow at landfill is southwest through low, boggy spruce-covered area. Slope of active landfilling area in mid- to late-1985 possibly leads to surface and shallow groundwater flow to the northeast.

Onsite or nearby ground-water information: Domestic wells within a mile or two from site range in depth from a few tens of feet to about 100 feet; water levels are commonly less than 20 feet below land surface, and several deeper (about 100 feet) wells near Big Lake reportedly flow at the surface.

Information on ground-water conditions within the site is available from a 1982 report by Arctic Engineering Inc. Five 25-foot borings were made; none encountered ground water. Two wells were drilled:

No. 1 -- Depth 85 feet, confined water-bearing zone at 58-59 feet, WL = 24 feet

USGS designation: Big Lake LF-5
USGS ID 613239 149471901

No. 2 -- Depth 70 feet, water-bearing zones at 59-60 and 69-70 feet, WL = 12 feet

Monitoring wells: Four water-quality monitoring wells were drilled in February 1986. Drill logs and construction data follow.

BIG LAKE SITE -- Mat-Su Landfills (cont)

Big Lake LF No. 1 [USGS ID 613235 1494734401]

Well depth -- 21 feet
Water level -- 3.5 feet below lsd
Well finish -- 10 slot screen (16-21 feet)
Well log --

0 - 6	Peat/organic material
6 - 12	Cobbles with clay, water
12 - 15	Gravel with clay,dry
15 - 24	Gravel and sand, water
24 - 28	Sand and gravel in clay, dry (Pull casing, finish well at 21 feet)

Big Lake LF No. 2 [USGS ID 613243 1494729011]

Well depth -- 65 feet
Water level -- 30 feet below lsd
Well finish -- 12 slot screen (60-65 feet)
Well log --

0 - 12	Silt, sand and gravel (odor of "garbage")
12 - 21	A/A, with clay-size material interspersed or in very thin zones, dry
21 - 30	Sand and silt, dry
30 - 34	Silt, clayey, damp
34 - 37	A/A, but dry
37 - 53	Gravel and silt (= Till? -- hole stays open while drilling ahead of casing from 4-5 ft) dry
53 - 56	A/A, but damp
56 - 58	A/A, dry again
58 - 60	A/A, wet
60 - 66	Gravel, broken gravel-size rock pieces, sand, with water

BIG LAKE SITE -- Mat-Su Landfills (cont)

Big Lake LF No. 3 [USGS ID 613235 1494728011

Well depth -- 37.5 feet
Water level -- 12 feet below lsd
Well finish -- Open end
Well log --

0 - 6	Peat, organic material
6 - 10	Clay with gravel, dry
10 - 15	A/A, but damp
15 - 18	Gravel and cobbles, water
18 - 24	Gravel, clayey, less water than above
24 - 30	Gravel, broken grav-sized material, water (clayey from 27 feet)
30 - 36	Sand and silt with gravel, dry
36 - 45	Sand and gravel, clayey, a little damp
45 - 48	Sand and gravel, dry
48 - 50	Silt, sandy, dry
50 - 54	Sand and gravel, dry (clay streak)
54 - 60	Silt/clay, heaving (Pull casing to 37.5 feet, some water entering from below, hole caving in)

Big Lake LF No. 4 [USGS ID 613235 1494728021

Well depth -- 22 feet
Water level -- 5 feet below lsd
Well finish -- 15 slot screen (17-22 feet)
Well log --

0 - 8	Peat, organic material
8 - 10	Cobbles in clay, water
10 - 12	Gravel and "rocks"
12 - 17	A/A, clayey, with water
17 - 22	Cobbles, broken "rocks", water
22-	A/A, with clay

Leo A. Brueggeman
Star Rt. Box 2275
Wasilla, Alaska 99687

BLUE BEAR DRILLING

Telephone 892-6342
Mile 1, Big Lake Road

WATER WELL LOG

Property Owner MAT-SU BOROUGH Date Completed 8-28-81

Location SANITARY FILL LF-5

Mailing Address BIG LAKE, AK

Driller _____

Depth of Well 85 ft. Casing Diameter 6 in. Total Casing Installed _____

Static Water Level (measured from ground surface) _____

Well Yield _____ GPM

WATER WELL #1

Depth from	Depth to	Formation
0	6	TAN CLAY & GRAVEL
6	26	GRAVEL IMBEDED IN TAN SILT
26	33	GRAVEL IMBEDDED IN GREY SILTY CLAY
33	58	GRAVEL MIXED WITH GREY & BROWN CLAY (HARD PACKED)
58	59	LOOSE GRAVEL MIXED BLACK SAND & SILT (WATER BEARING
59	85	GRAVEL MIXED WITH GREY & BROWN CLAY (HARD PACKED (NO WATER)
		WATER SAMPLE TAKEN FROM 58'-59' ZONE PRODUCING APPROX. 2 GPM WOULD NOT CLEAR

General Information

Leo A. Brueggeman
Star Rt. Box 2275
Wasilla, Alaska 99687

BLUE BEAR DRILLING

Telephone 892-6342
Mile 1, Big Lake Road

WATER WELL LOG

Property Owner MAT-SU BOROUGH Date Completed 8-28-81

Location SANITARY FILL

Mailing Address BIG LAKE, AK

Driller

Depth of Well 70 ft. Casing Diameter 6 in. Total Casing Installed

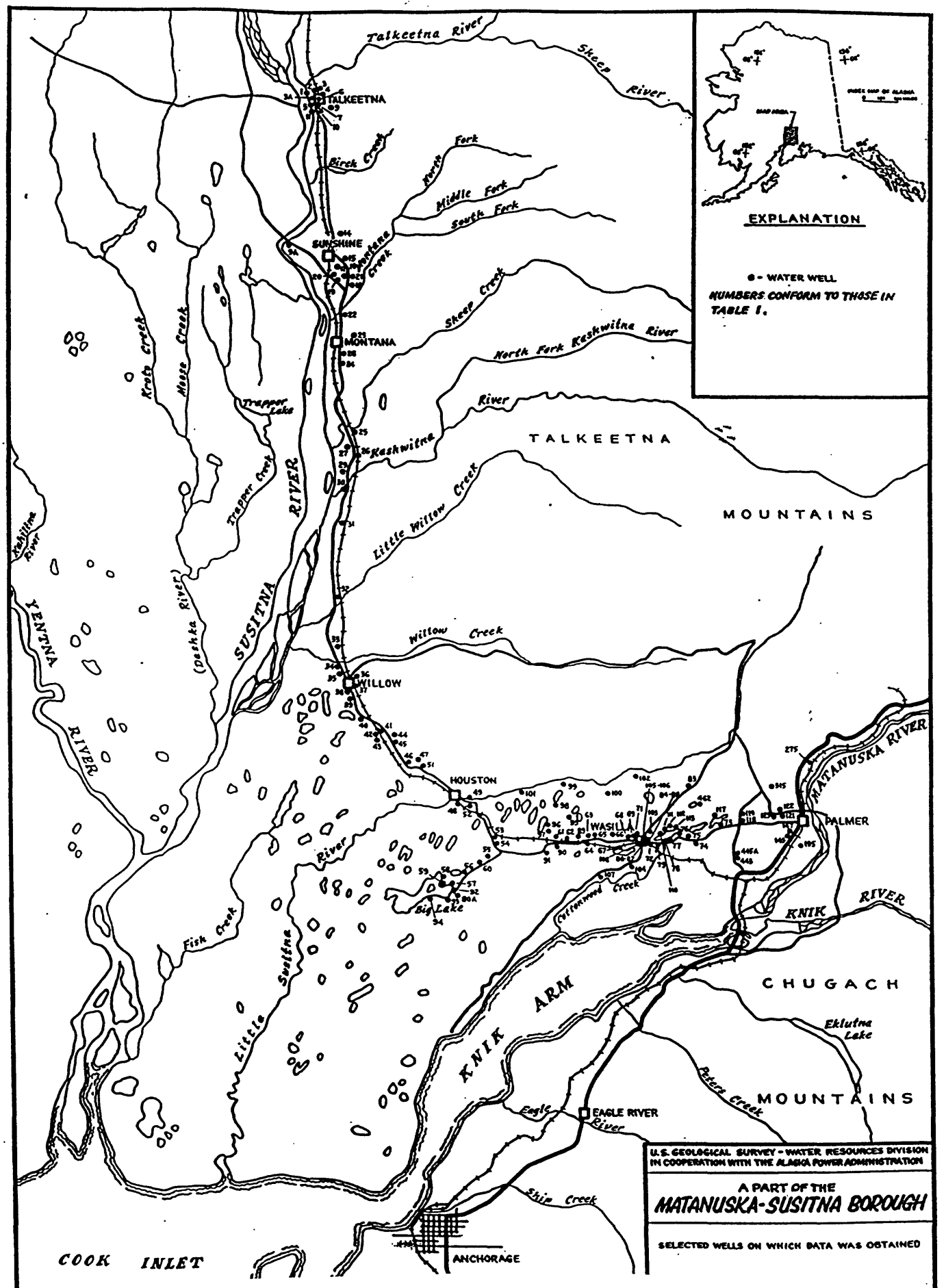
Static Water Level (measured from ground surface) 12"

Well Yield 15 GPM

WATER WELL #2

Depth from	Depth to	Formation
0	22	BROWN SILTY SAND & GRAVEL
22	59	GRAVEL EMBEDDED IN GREY SILT (HARD PACKED)
59	60	SEEPS OF WATER IN GREY SILTY CLAY (BOILED OUT AS MUD)
60	69	GRAVEL EMBEDDED IN GREY SILT (HARD PACKED)
69	70	BLUE SAND & GRAVEL WITH WATER
		CLEANED UP PUMPED 15 GPM WITH 15' DRAWDOWN
		WATER SAMPLE TAKEN FROM THIS ZONE

General Information



This figure corresponds with the following table(s).

.--Records of wells in the Matanuska-Susitna Borough area--

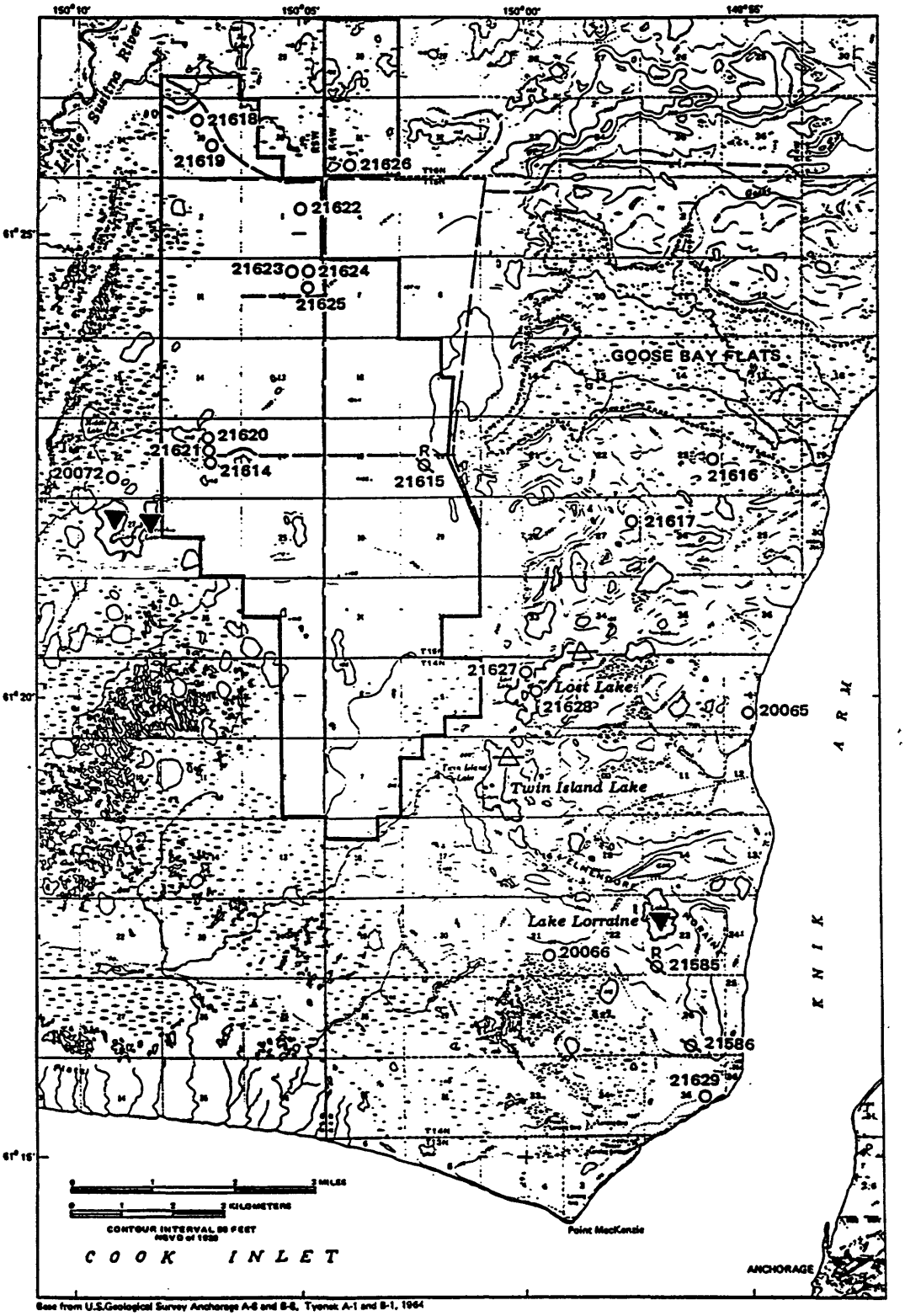
Well no.	Owner or name	Well depth (feet)	Well diameter (inches)	Depth to water (feet)	Pumping rate (gallons per min.)	Drawdown (feet)	Remarks
29	F. J. Smith	24	8	-	-	-	
30	A. G. Coleman	77	6	42	-	-	
31	Arnold Echola	72	6	25	11	15	L, C
32	M. and G. Persing	29	6	8	7 1/2	8	L
33	A. M. Hazel	35	2	30	-	-	
34	Alaska Department of Highways	28	6	8	-	-	Highly organic water
35	Homer Springer	47	6	-	-	-	
36	Willow Trading Post	85	-	-	-	-	
37	L. C. Hazel	40	6	-	-	-	
38	Willow Elementary School	80	-	-	-	-	C
39	Willow General Store	64	6	-	-	-	
40	Willow Inn	72	6	-	-	-	
41	White's Crossing	68	6	-	-	-	
42	White's Trailer Court	68	6	-	-	-	
43	Nancy Lake Wayside (State)	130	6	24	10	20	L
44	Huseby's 76 Station	40	6	-	-	-	Small supply of water
45	Harold A. Nelson	46	6	32	5	0	
46	Houston Inn	150	6	-	-	-	Formerly supplie 100 people
47	John Linnebur	50	6	-	-	-	
48	Calvin Hartman	27	6	9	7 1/2	1	L
49	Church of Christ, Houston	100	6	+1	-	-	Artesian flow, L
51	Ruby Manion	118	6	96	10	9	L
52	Houston Lodge	22	1 1/4	11	-	-	Driven well
53	Ray Grunert	42	6	-	-	-	
54	Edward Wasey	91	6	21	10	62	L
55	Richard Kopsack	12	20	16	-	-	Dug well

--Records of wells in the Matanuska-Susitna Borough area--

Well no.	Owner or name	Well depth (feet)	Well diameter (inches)	Depth to water (feet)	Pumping rate (gallons per min.)	Drawdown (feet)	Remarks
56	Big Y Grocery and Station	36	6	-	-	-	
57	Big Lake Summer Camp	31	6	-	300	-	Supplies 30 people
58	Ship Ahoy, Big Lake	108	6	-	80		
59	Marvin Heikes	50	6	20	-	-	
60	Edward Wasey	22	24	-	-	-	Dug well
61	Rainbow Lake Lounge	48	6	-	-	-	
62	Richard Benner	100	6	-	-	-	
63	William Priddy	57	6	-	50	-	
64	Henry Burton	90	6	-	-	-	
65	Meyers Coffee Shop	29	6	-	30	0	
66	William Church	66	6	-	-	-	
67	Hallea Lodge	57	6	-	-	-	
68	Polis Hotel	60	6	-	-	-	
69	Eskimotel	33	6	-	-	-	
71	Cottle's Texaco Station	35	6	-	-	-	
72	Wasilla Bldg. and Farm Supply	42	6	-	-	-	
73	Ernest Sullivan	48	6	-	-	-	
74	William Patrick	92	6	-	-	-	
75	Lutheran Youth Center	175	6	-	-	-	
76	Leslie Green	20	4	-	-	-	
77	Chester Tracy	52	6	-	-	-	
78	Green Acres Resort	65	6	-	-	-	
79	J. C. Wright	74	6	10	7 1/2	4	L
80	Homer Mayo	47	6	-	-	-	
80a	Big Lake School	48	6	-	-	-	C
81	Jack Minnick	35	36	-	-	-	Dug well
82	James Calder	43	6	-	-	-	
83	Robert Clarke	170	8	-	-	-	

-Records of wells in the Matanuska-Susitna Borough area-

Well no.	Owner or name	Well depth (feet)	Well diameter (inches)	Depth to water (feet)	Pumping rate (gallons per min.)	Drawdown (feet)	Remarks
84	Dennis Crawford	69	8	-	-	-	C
85	Alaska Railroad Station, Wasilla	131	8	16	5	8	
86	Ray Morrison	65	6	-	-	-	
87	Teeland's Store	18	9	-	-	-	Dug well
87a	Lakeside Hotel	40	6	-	-	-	
88	Teeland's Residence	18	24	-	-	-	
89	A. D. Ruff	90	6	35	-	-	
90	Oran McMillan	54	6	-	-	-	
91	Carl Berato	26	6	-	-	-	
92	Big Lake Lodge	35	4	-	200	-	
93	Homer Merchant	14	4	-	-	-	
94	Yacht Club (Big Lake)	42	4	-	-	-	
95	M. Fuller	72	6	32	10	26	L
96	Len Melton	60	6	40	7 1/2	5	L
97	Tom Phillips	43	6	16	7 1/2	4	L
98	John Businoff	170	6	54	1	2	L
99	John Moss	55	6	-	-	-	
100	Raymond Dahm	253	6	-	-	-	
101	Jess Harker	52	6	37	10	5	L
102	Charles Carney	53	20	-	-	-	Dug well
103	Frank Smith	42	6	-	-	-	
104	Frank Smith	110	6	-	-	-	
105	Robert Vroman	70	6	27	13	32	L
106	James Gatewood	107	6	25	10	30	L
107	O. L. Byers	60	6	14	7 1/2	14	L
108	Wasilla Elementary School	87	6	-	-	-	
110	John Wallman	37	6	-	-	-	
111	Barney Locke	65	6	-	30	5	



– Location of data-collection sites.

This figure corresponds with the following table(s).

- Summary of well data

Well number	Owner or name	Driller	Year completed	Altitude (ft above sea level)	Depth (ft)	Depth of openings (ft)	Aquifer type	Yield (gal/min)	Water level (ft below land surface)	Date measured	Specific conductance of water (µmhos/cm at 25°C)	Date measured	Remarks
20072	Gulf Oil	Penn Jersey	1969	111	200	200	Confined	65	3	01-01-69	--	--	--
20073	Ward Gay	Penn Jersey	1971	70	298	298	Confined	175	30	Unknown	--	--	Water reported by owner to be too salty to drink.
21585	Matanuska-Susitna Borough	M-W	1981	130	398	379-398	Confined	310	106 104.82 104.42 104.46 104.87 104.39 104.82 105.51 105.38 105.22 104.08	03-18-81 07-29-81 09-15-81 09-17-81 12-09-81 03-23-81 05-19-82 06-22-82 08-27-82 09-23-82 02-23-83	675	02-15-81	Water levels influenced by tides in the order of 0.2 -0.5 ft. Continuous water-level recorder installed Sept. 16, 1981
21586	Matanuska-Susitna Borough	M-W	1981	152	358	318-323	Confined	>5	142	03-03-81	338	02-12-81	Water levels influenced by tides in the order of 2 ft.
21614	USGS test well	M-W	1983	140	231	231	Confined	50	11.32 11.40 11.14	09-07-83 09-17-83 10-06-83	200	09-17-83	Drilled to 200 ft in Sept. 1982, deepened to 231 ft in Aug. 1983.
21615	USGS test well	M-W	1982	185	318	318	Confined	>7	90.0 90.0 89.6 90.17 89.98 88.87 89.24 89.11 89.40	10-12-82 10-20-82 02-18-83 04-28-83 06-16-83 08-01-83 08-29-83 09-19-83 10-06-83	2100	10-12-82	Continuous water level recorder installed Oct. 12, 1982.
21616	John Faco	M-W	1982	65	73	73	Water table	6	60 58.95 59.03 59.12	07-12-82 06-16-83 08-01-83 09-19-83			
21617	Greg Bell	M-W	1982	200	380	380	Confined	1	141.22 144.33 141.21	06-16-83 08-01-83 09-19-83			
21618	Karen Lee	M-W	1982	120	239	239	Confined	200	2 4.55a 5.18a	07-29-82 06-06-83 09-19-83	350	08-24-82	
21619	Karen Lee	M-W	1982	120	60	60	Water table	5	28 26.67 27.11 27.39	07-29-82 06-16-83 08-01-83 09-19-83	280	08-24-82	
21620	Milburn Tucker	Wheaton	1983	125	206	206	Confined	150	0	06-01-83	205	10-06-83	
21621	Milburn Tucker	Wheaton	1983	126	242	242	Confined	300	8	06-01-83	205	10-06-83	
21622	Dr. John James	Durbin	1983	145	60	60	Water table	10	25	06-10-83	200	10-06-83	
21623	H&R Farms #1	Durbin	1983	155	60	60	Water table	35	27	06-10-83	230	10-06-83	
21624	H&R Farms #2	Durbin	1983	155	60	60	Water table	30	24	07-01-83	210	10-06-83	
21625	H&R Farms #3	Durbin	1983	150	60	60	Water table	30	24	07-01-83	--	--	
21626	Sande Wright	Moon	1983	145	60	60	Water table	--	--	--	200	06-10-83	
21627	Jack Culhane	Penn Jersey	1983	130	256	256	Confined	10	93	03-09-83	1020	--	Water contains some gas.
21628	Jerry Culhane	Penn Jersey	1983	130	181	181	Confined	30	80	03-11-83	890	--	Water contains some gas.
21629	Roy Syren	Syren Bros.	1982	140	196	196	Confined	25	130	03-12-82	--	--	

a Recently pumped

Depth below land surface in feet	Lithologic description
Well 20072, Gulf Oil, NW¼ SW¼ sec.22, T.15 N., R.5 W. [Log by Penn Jersey]	
0 to 14	Muskeg
14 to 19	Sand (water)
19 to 40	Clay
40 to 62	Sand and clay
62 to 168	Quicksand
168 to 194	Clay
194 to 197	Sand (water)
197 to 200	Gravel (water)
Well 20073, Ward Gay, NE¼ SE¼ sec.24, T.15 N., R.6 W. [Log by Penn Jersey]	
0 to 80	Sand
80 to 290	Sand and silt
290 to 300	Gravel
Well 21585, Matanuska-Susitna Borough test well, SW¼ SW¼ sec.23, T.14 N., R.4 W. [Log by USGS]	
1 to 4	Silty sand and gravel
4 to 15	Silty sand and gravel (water)
15 to 26	Silty sand (water)
26 to 35	Clay
35 to 55	Silty, sandy clay (damp)
55 to 63	Clay
63 to 125	Hardpan
125 to 130	Silty sand and gravel (water)
130 to 170	Sand and gravel (water)
170 to 188	Clay
188 to 197	Gravelly clay
197 to 219	Clayey, silty sandy gravel
219 to 284	Sand and gravel (water)
284 to 294	Sand (water)
294 to 309	Sand and gravel (water)
309 to 312	Gravelly sand (water)
312 to 323	Silty sand (water)
323 to 338	Silty sand and gravel (water)
338 to 398	Sand and gravel (water)

Depth below land surface in feet	Lithologic description
Well 21586, Matanuska-Susitna Borough test well, SW¼ SE¼ sec.26, T.14 N., R.4 W. [Log by USGS]	
1 to 8	Sand and gravel
8 to 18	Silty sand
18 to 23	Sand (water)
23 to 31	Clay, gray
31 to 106	Gravelly clay, gray
106 to 116	Clayey gravel
116 to 156	Silty gravel
156 to 166	Sand and gravel (water)
166 to 185	Hard dry silt
185 to 198	Sand and gravel (water)
198 to 203	Sand (water)
203 to 219	Silt, sand, and gravel
219 to 225	Sandy, sand and gravel (water)
225 to 238	Gravel (water)
238 to 328	Sand and gravel (water)
328 to 339	Sand, heaving (water)
339 to 349	Silty sand and gravel, heaving (water)
349 to 351	Silty gravel
351 to 352	Cemented sand and gravel
352 to 358	Clay, sticky
Well 21614, USGS test well SW¼ NE¼ sec.23, T.15 N., R.5 W. [Log by USGS]	
0 to 14	Sand and gravel
14 to 43	Sand and gravel (wet)
43 to 78	Clay, gray
78 to 80	Silty sand and gravel, gray
80 to 104	Silty sand, gray
104 to 111	Silty clay, gray
111 to 133	Sand, gray
133 to 145	Gravelly silt, gray
145 to 158	Sandy silt, gray
148 to 178	Gravelly silt, gray
178 to 200	Sandy silt, gray
200 to 210	Sandy silt, gray
210 to 213	Medium-fine sand, gray (water to 210 ft)
213 to 215	Silty, fine sand, gray
215 to 220	Coarse to very-fine sand and wood fragments
220 to 224	Silty sand and wood fragments
224 to 227	Gravelly silt, gray (yields virtually no water)
227 to 231	Sand and gravel (water)

Depth below land surface in feet	Lithologic description
Well 21615, USGS test well, NE¼ SW¼ sec.20, T.15 N., R.4 W. [Log by USGS]	
2 to 20	Sand, gravel, and cobbles
20 to 45	Sand and gravel
45 to 50	Silt, brown
50 to 63	Sand (water)
63 to 72	Silty gravel
72 to 74	Silt, brown
74 to 76	Sand and gravel (water)
76 to 80	Silty sand and gravel
80 to 90	Sand and gravel (water)
90 to 95	Silt, gray
95 to 100	Clay, brownish gray
100 to 114	Clayey silt with thin sand lenses (water)
114 to 120	Gravelly silt
120 to 258	Clayey silt, gray
258 to 278	Sandy and clayey silt, gray
278 to 314	Silty gravelly clay, gray
314 to 318	Sand and gravel (water)
Well 21616, John Faeo, NW¼ SE¼ sec.23, T.15 N., R.4 N. [Log by M-W Drilling]	
0 to 18	Topsoil
18 to 19	Very hard cobble gravel
19 to 38	Sand
39 to 58	Layered sand and gravel
58 to 68	Sand
68 to 73	Sand and gravel (water)
Well 21617, Greg Bell, SE¼ NE¼ sec.27, T.15 N., R.4 W [Log by M-W Drilling]	
0 to 2	Topsoil
2 to 103	Sand, very fine
103 to 136	Silty clay
136 to 198	Clay
198 to 238	Silty clay
238 to 328	Clay
328 to 338	Clay - hardpan
338 to 373	Hardpan (till)
373 to 380	Sand, very fine, heaving

Depth below land surface in feet	Lithologic description
	Well 21618, Karen Lee (Dairy West), SE¼ NW¼ sec.35, T.16 N., R.5 W [Log by M-W Drilling]
0 to 26	Sandy gravel
26 to 30	Gravel (damp)
30 to 58	Sandy clay
58 to 78	Silty sand
78 to 86	Silty sand and clay
86 to 98	Clayish hardpan
98 to 104	Clay - hardpan
104 to 106	Hardpan and gravel (damp)
106 to 200	Clay
200 to 206	Sand, fine, gray
206 to 219	Silty sand and gravel
219 to 239	Gravel (water)
	Well 21619, Karen Lee (Dairy West) NW¼ SE¼ sec.35, T.16 N., R.5 W. [Log by M-W Drilling]
2 to 34	Sand and gravel
34 to 38	Sand (damp)
38 to 50	Sand and gravel (water)
	Well 21622, Dr. John James, SW¼ NE¼ sec.5, T.15 N., R.5 W. [Log by Durbin Drilling]
0 to 40	Sand and gravel
40 to 60	Sand and gravel (water)
	Well 21623, H&R Farms #1, NE¼ NE¼ sec.12, T.15 N., R.5 W. [Log by Durbin Drilling]
0 to 60	Sand and gravel
	Well 21624, H&R Farms #2, SE¼ NE¼ sec.12, T.15 N., R.5 W. [Log by Durbin Drilling]
0 to 60	Sand and gravel

Depth below land surface in feet	Lithologic description
Well 21625, H&R Farms #3, SE¼ NE¼ sec.12, T.15 N., R.5 W. [Log by Durbin Drilling]	
0 to 60	Sand and gravel
Well 21627, Jack Culhane, SW¼ NE¼ sec.4, T.14 N., R.4 W. [Log by Penn Jersey]	
0 to 15	Topsoil
15 to 17	Clay and gravel
17 to 21	Sandy gravel (damp)
21 to 23	Clay
23 to 24	Boulder
24 to 33	Clay
33 to 133	Gray clay
133 to 134	Boulder
134 to 137	Clay and gravel
137 to 155	Gray clay
155 to 230	Clay and gravel (damp)
230 to 253	Clay and gravel (dry)
253 to 256	Sand and gravel
Well 21628, Jerry Culhane, NW¼ SE¼ sec.4, T.14 N., R.4 W. [Log by Penn Jersey]	
0 to 2	Topsoil
2 to 13	Clay and gravel (damp)
13 to 26	Gray clay and gravel
26 to 56	Clay and gravel (damp)
56 to 78	Clay and gravel
78 to 136	Clay
136 to 180	Clay and gravel
180 to 181	Sandy gravel
Well 21629, Roy Syren, NE¼ SE¼ T.14 N., R.4 W. [Log by Syren Bros. Drilling]	
0 to 8	Gravel and sand
8 to 18	Sand and gravel (wet)
18 to 30	Gravel
30 to 50	Sandy gravel (wet)
50 to 136	Clay
136 to 157	Gravel and clay
157 to 166	Sand and gravel (damp)
166 to 178	Gray, silt and gravel (wet)
178 to 190	Sand, gravel, and silt (water)
190 to 196	Sand and gravel (water)

APPENDIX 2

Water-quality data near Big Lake, Alaska

CHEMICAL & GEOLOGICAL LABORATORIES OF ALASKA, INC.

TELEPHONE (907)-279-4014
274-3364
ANCHORAGE INDUSTRIAL CENTER
5633 B Street

ANALYTICAL REPORT

CUSTOMER Arctic Environmental Eng. SAMPLE LOCATION: Big Lake, Alaska

DATE COLLECTED 8-31-81 TIME COLLECTED: ---

SAMPLED BY --- SOURCE Well #1

REMARKS BIG LAKE LANDFILL

FOR LAB USE ONLY

RECVD. BY GY LAB # 8726

DATE RECEIVED 8-31-81

DATE COMPLETED 9-8-81

DATE REPORTED 9-9-81

SIGNED Archie L. Swan

	mg/l		mg/l		mg/l
[]Ag, Silver	< 0.05	[]P, Phosphorous	< 0.05	[]Cyanide	
[]Al, Aluminum	0.10	[]Pb, Lead	< 0.05	[]Sulfate	
[]As, Arsenic	< 0.05	[]Pt, Platinum	< 0.05	[]Phenol	
[]Au, Gold	< 0.05	[]Sb, Antimony	< 0.05	[]Total Dissolved Solids	
[]B, Boron	< 0.05	[]Se, Selenium	< 0.05	[]Total Volatile Solids	
[]Ba, Barium	< 0.05	[]Si, Silicon	6.1	[]Suspended Solids	
[]Bi, Bismuth	< 0.05	[]Sn, Tin	< 0.10	[]Volatile Suspended Solids	
[]Ca, Calcium	74	[]Sr, Strontium	0.40	[]Hardness as $CaCO_3$	
[]Cd, Cadmium	< 0.01	[]Ti, Titanium	< 0.05	[]Alkalinity as $CaCO_3$	
[]Co, Cobalt	< 0.05	[]W, Tungsten	< 1	[X] Sulfide	< 0.002
[]Cr, Chromium	< 0.05	[]V, Vanadium	< 0.05	[X] COD	14
[]Cu, Copper	< 0.05	[]Zn, Zinc	0.17	[]	
[]Fe, Iron	0.68	[]Zr, Zirconium	< 0.05	[]	
[]Hg, Mercury	< 0.05	[]Ammonia Nitrogen-N		* * * * * []mmhos Conductivity	
[]K, Potassium	2.5	[]Kjedahl Nitrogen-N		[]pH Units	
[]Mg, Magnesium	11	[]Nitrate-N		[]Turbidity NTU	
[]Mn, Manganese	0.38	[]Nitrite-N		[]Color Units	
[]Mo, Molybdenum	< 0.05	[]Phosphorus (Ortho)-P		[]T.Coliform/100ml	
[]Na, Sodium	4.9	[]Chloride		[]	
[]Ni, Nickel	< 0.05	[X]Fluoride	< 0.10	[]	

CHEMICAL & GEOLOGICAL LABORATORIES OF ALASKA, INC.

TELEPHONE (907)-279-4014
274-3364

ANCHORAGE INDUSTRIAL CENTER
5633 B Street

ANALYTICAL REPORT

STOMER Artic Environmental Egrs. SAMPLE LOCATION: Big Lake Landfill, AK

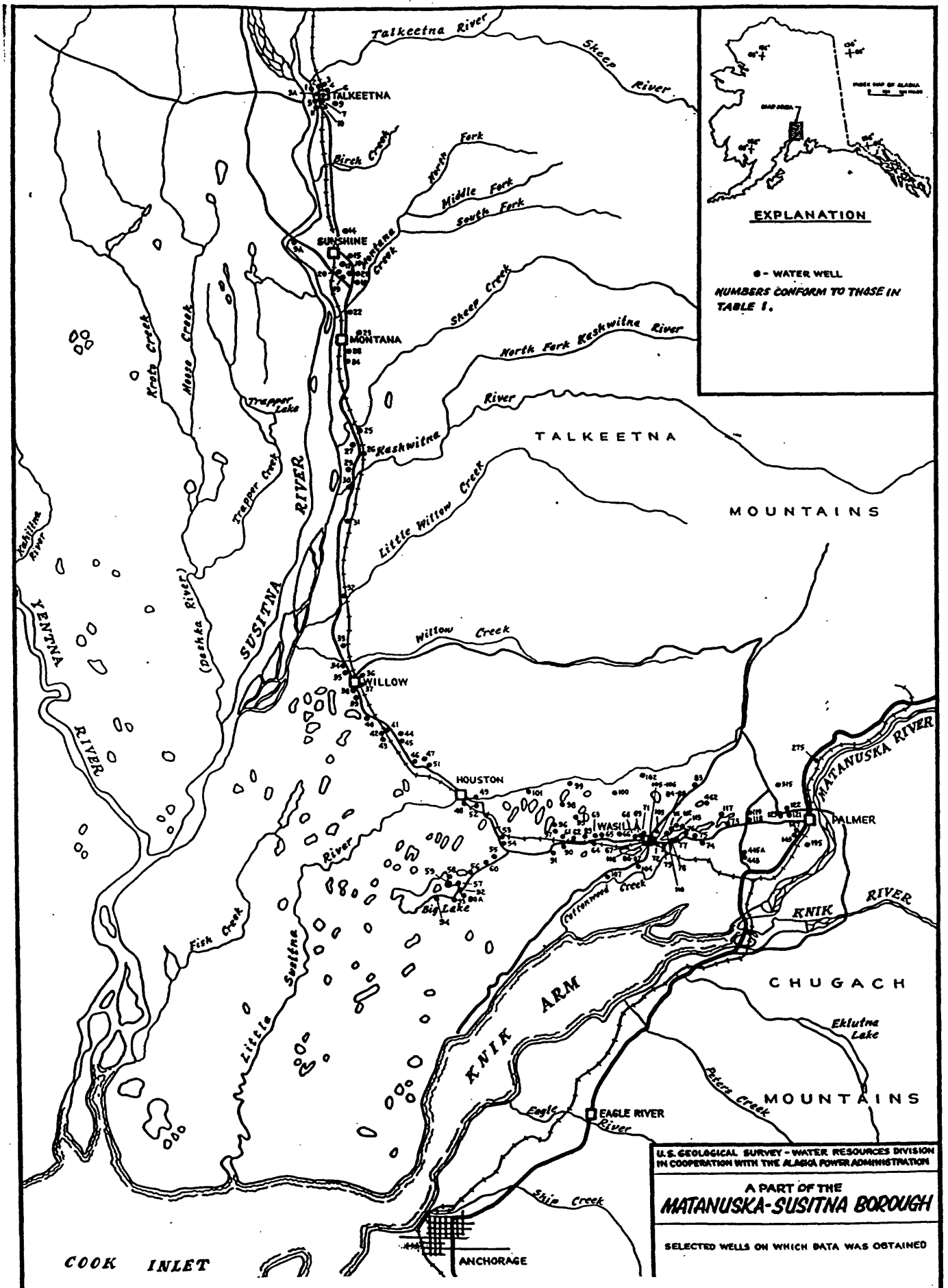
TE COLLECTED 8-20-81 TIME COLLECTED: 2015 Hrs.

MPLED BY L. Brueggeman SOURCE Water Test Hole #2

MARKS BIG LAKE LANDFILL

FOR LAB USE ONLY
RECVD. BY GY LAB # 8632
DATE RECEIVED 8-21-81
DATE COMPLETED 8-31-81
DATE REPORTED 9-1-81
SIGNED Archie L. Green

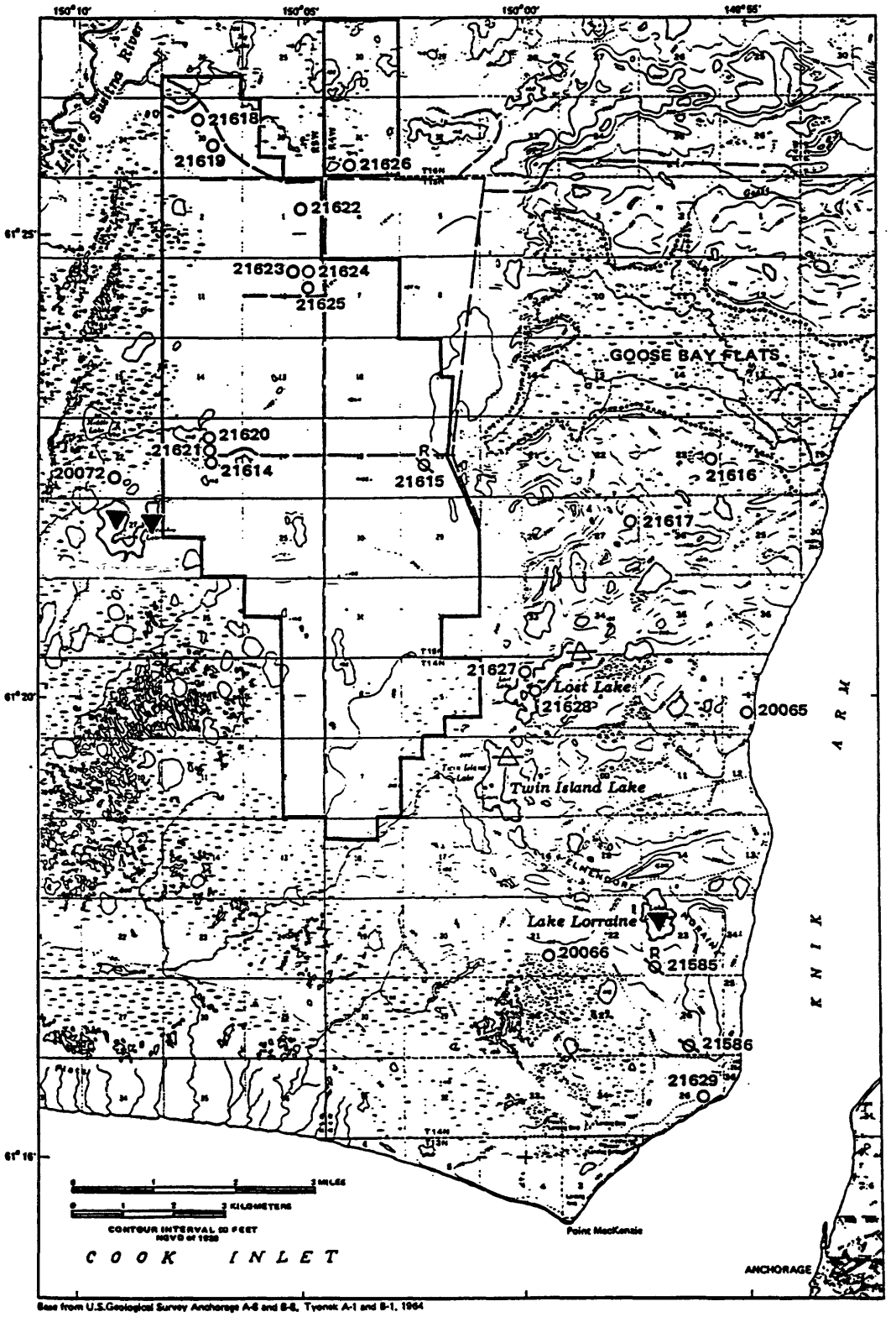
	mg/l		mg/l		mg/l
Ag, Silver	<0.05	[]P, Phosphorous	<0.05	[]Cyanide	
Al, Aluminum	0.07	[]Pb, Lead	<0.05	[]Sulfate	
As, Arsenic	<0.05	[]Pt, Platinum	<0.05	[]Phenol	
Au, Gold	<0.05	[]Sb, Antimony	<0.05	[]Total Dissolved Solids	
B, Boron	<0.05	[]Se, Selenium	<0.05	[]Total Volatile Solids	
Ba, Barium	<0.05	[]Si, Silicon	4.1	[]Suspended Solids	
Bi, Bismuth	<0.05	[]Sn, Tin	<0.10	[]Volatile Suspended Solids	
Ca, Calcium	18	[]Sr, Strontium	0.15	[]Hardness as $CaCO_3$	83
Cd, Cadmium	<0.01	[]Ti, Titanium	<0.05	[]Alkalinity as $CaCO_3$	
Co, Cobalt	<0.05	[]W, Tungsten	<1	[]	
Cr, Chromium	<0.05	[]V, Vanadium	<0.05	[] COD	7.8
Cu, Copper	<0.05	[]Zn, Zinc	<0.05	[] Sulfide	<0.002
Fe, Iron	0.41	[]Zr, Zirconium	<0.05	[]	
Hg, Mercury	<0.05	[]Ammonia Nitrogen-N		* * * * * * []mmhos Conductivity	
K, Potassium	1.0	[]Kjedahl Nitrogen-N		[]pH Units	
Mg, Magnesium	9.0	[]Nitrate-N		[]Turbidity NTU	
Mn, Manganese	<0.05	[]Nitrite-N		[]Color Units	
Mo, Molybdenum	<0.05	[]Phosphorus (Ortho)-P		[]T.Coliform/100ml	
Na, Sodium	5.0	[]Chloride		[]	
Ni, Nickel	<0.05	[]Fluoride	<0.10	[]	



This figure corresponds with the following table(s).

Chemical analyses of well waters in the Matanuska-Susitna Borough area - concentrations in milligrams per liter

Well No.	Owner or name	Date sampled	Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
																Carbonate	Noncarbonate			
1	Talkeetna Motel	9-20-66	14	0.71		16	4.6	6.4	1.4	56	9.1	11	0.1	5.0	96	59	13	155	6.8	0
3a	USGS Test Well 3	9-15-67	13	0.10		24	1.0	4.5	2.0	67	6.0	11	0.1	1.1	96	64	9	156	7.5	0
9a	State of Alaska		16	1.23		20	1.8	8.2	3.2	98	0	0	0.2	0.1	99	58	6	146	7.8	5
14	Joe Heck	7-27-67	18	0.13		8.0	1.7	3.1	1.0	34	3.0	2.8	0.0	0.5	55	27	0	71	6.8	0
19	H & H Grocery Store	7-27-67	20	0.69		7.6	1.5	2.3	0.9	30	3.0	2.5	0.0	0.8	54	25	0	65	6.1	0
31	Arnold Echola	7-28-67	17	1.01		38	5.6	4.9	2.3	161	2.5	1.4	0.3	0.2	153	119	0	245	7.8	0
38	Willow Elem. School	7-28-67	23	7.0		44	6.4	5.1	2.2	180	5.0	0.7	0.3	0.3	177	136	0	263	7.7	0
80a	Big Lake School	11-15-63	12	0.02	0.02	13	1.9	1.7	0.5	51	1.0	1.5	0.0	1.0	58	40	42	88	7.7	5
84	Dennis Crawford	8-03-67	15	0.12		57	6.6	2.6	0.8	164	17	7.4	0.0	22	209	170	46	329	8.0	0
112	Toyon Country Club	8-05-67	12	0.03		40	5.0	3.2	0.3	142	8.0	0.4	0.5	1.4	141	120	4	221	8.0	0
117	Barry's Finger Lake Res	8-01-66	10	0.00		36	12	3.5	1.0	155	17	1.4	0.1	1.9	159	140	13	260	7.4	10
121	City of Palmer Well 1	11-01-52	15	0.06		34	9.1	6.2	1.2	160	9.9	2.5	0.2	0.2	155	122	0	261	7.5	-
122	City of Palmer Well 2	7-22-66	11	0.02		37	6.7	5.7	1.8	162	5.8	2.1	0.1	0.0	150	120	0	253	8.0	5
123	City of Palmer Well 3	8-23-67	12	0.00		13	4.5	51	1.1	153	34	4.6	0.2	0.1	195	51	0	305	8.2	5



-- Location of data-collection sites.

This figure corresponds with the following table(s).

Chemical analyses of ground water

Well number	Sample depth (ft)	Date of sample	Specific conductance (µmho/cm)	pH	Temperature (°C)	Hardness (mg/L as $CaCO_3$)	Hardness noncarbonate (mg/L as $CaCO_3$)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Percent sodium	Sodium adsorption ratio
21585	137	02-19-81	250	8.3	3.0	110	0.00	24	13	12	18	0.5
	277	02-23-81	400	8.7	4.0	140	.00	31	15	45	41	1.7
	347	02-25-81	675	8.8	4.0	83	.00	22	6.8	120	75	5.7
21586	158	02-12-81	338	8.2	3.5	72	.00	15	8.5	54	61	2.8
	240	02-13-81	338	8.1	3.5	93	.00	22	9.2	43	49	1.9
21615	318	10-12-82	2100	8.3	3.5	330	--	54	48	400	72	9.6
21618	239	09-24-82	350	8.2	3.5	63	.00	13	7.5	58	64	3.5
21619	50	09-24-82	280	7.9	3.5	95	4.0	31	4.3	18	29	.8
21614	231	09-07-83	215	8.2	3.0	110	.00	37	3.7	2.8	5	.1

Well number	Date of sample	Potassium, dissolved (mg/L as K)	Alkalinity lab (mg/L as $CaCO_3$)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Silica dissolved (mg/L as SiO_2)	Solids, sum of constituents, dissolved (mg/L)	Nitrogen, NO_2+NO_3 dissolved (mg/L as N)	Phosphorus, dissolved (mg/L as P)	Arsenic dissolved (ug/L as As)
21585	02-19-81	2.9	120	9.5	3.1	0.1	13	150	0.00	0.060	13
	02-23-81	3.1	200	8.7	16	.2	12	252	.00	.070	22
	02-25-81	2.5	190	14	97	.2	11	388	.00	.060	6
21586	02-12-81	1.9	170	9.1	3.3	.5	9.1	204	.00	.040	8
	02-13-81	2.9	150	7.3	17	.2	12	204	.00	.040	9
21615	10-12-82	9.2	< 1.0	130	700	.2	12	1430	< .10	.040	15
21618	09-24-82	5.1	181	< 5.0	7.8	.3	15	--	< .10	.990	38
21619	09-24-82	1.3	91	8.0	23	< .1	10	151	.20	.020	1
21614	09-07-83	1.4	108	5.3	1.2	< .1	13	130	< .1	.030	--

-Continued

Well number	Date of sample	Boron dissolved (µg/L as B)	Iron, dissolved (µg/L as Fe)	Manganese, dissolved (µg/L as Mn)
21585	02-19-81	90	30	100
	02-23-81	170	40	90
	02-25-81	200	60	60
21586	02-12-81	410	20	40
	02-13-81	160	40	80
21615	10-12-82	130	560	170
21618	09-24-82	200	100	76
21619	09-24-82	30	14	6
21614	09-07-83	--	130	94

–Chemical analyses of ground water from the Matanuska Valley agricultural area, Alaska[1]

Well	Laboratory No.	Owner	Geologic source	Depth (feet)	Date of collection	Parts per million				
						Silica (SiO_2)	Iron (Fe) dissolved[2]	Iron (Fe) total	Manganese (Mn) dissolved[2]	Manganese (Mn) total
4	2259	Lazy Mountain Children's Home	Sand, gravel	280	11-13-53	8.6		0.07	0.05	
4a	217	do	Till	11	8-29-49	20		.02		
38	158	King	Gravel	12	8-27-49	8.2		.02		
70	306	Falk	Rock	110	7-13-50	19		.03	.02	
80	3256	McKinley	do	144	11-28-55	7.8	0.00	.09		0.01
101	2025[3]	Alaska Rural Rehabilitation Corporation	Gravel	49	10- 4-48	10	.03	.11		
123	157	Lester	Rock(?)	37	8-26-49	16		.06		
145	215	Thuma	Gravel	27	8-30-49	16		.02		
147	3327	do	Rock	146	2- 4-56	9.6	.00		.00	
195	3257	United States Geological Survey	Sand	112	11-16-55	8.9	.00	.10		.00
244	3050	Postishek	Gravel	129	6-21-55	9.9	.02	.12		.01
244a	3051	Norris	do	58	6-21-55	8.9	.70	2.4		
275	1060	Holtet	Sand	14	11-16-51	15		.02		
315	155	Yadon	Gravel	36	8-22-49	13		.02		
347	2024[3]	Albrecht	do	35	Oct. 1948	14		.05		
363	1672	City of Palmer	do	165	11- 1-52	13		.06		
443	861	Alaska Agricultural Experimental Station	do	36	9-11-51	11		.02		
445a	2648	United States Geological Survey	do	295	11- 9-54	20		.15		
462	159	Duff	do	32	8-14-49	23		7.2	.08	
494	153	Valley Christian Children's Home		40	8-22-49	26		.02		
522	216	Alaska Railroad, Wasilla	Gravel	21	8-31-49	15		.02		
522a	3003	do	do	131	5-25-55	14	.02	1.1	.23	.46
535	3208	Wasilla School	do	73	11-14-55			.02		.00
660	324	Alaska Railroad, Pittman	Till(?)	40	6-28-50	28		1.5		
Spring[5]	2023[3]	Matanuska Valley Farmers Cooperating Assoc.	Gravel		Oct. 1948	16	.04	.09		
Spring[6]	214	Dinkle	do		8-22-49	18		.02		
Spring[7]	1753		Sandstone		12- 4-52	10				

Well	Parts per million														
	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as ($CaCO_3$)	Noncarbonate hardness	Specific conductance (micromhos at 25°C)	pH
4	7.7	0.9	35	1.1	94	0	17	1.1		1.8	120	23	0	193	6.4
4a	29	7.6	3.9		91		6.1	8.0	0.0	24	143	104	29	224	6.9
38	51	5.6	5.5		143		36	4.5	.1	.8	182	150	33	307	7.7
70					194		120	4	.2	.3		244		515	8.0
80	56	5.9	6.0	1.2	147	0	41	5.0	.0	2.4	197	164	44	327	7.3
101	76	9.4	9.2		236		38	4.8	.1	9.4	273	228	34	444	
123	75	20	34		266		35	42	.1	35	388	269	51	657	6.8
145	147	30	33		371		73	74	.0	96	652	490	186	1,050	6.8
147	14	1.8	62	.9	206[4]		6.0	5.0	.9	.4	203	42	0	327	8.6
195	39	4.2	6.3	.8	97	0	40	5	.0	1.0	153	115	35	255	7.8
244	21	3.6	4.8	1.6	91	0	3.5	1.0	.0	1.6	92	67	0	156	7.1
244a	15	2.7	4.4	1.0	63	0	3.0	1.0		2.7	70	49	0	115	6.8
275	14	2.5	3.2		55		5.9	.8		.8	69	45	0	102	6.9
315	46	5.9	2.5		160		8.7	1.8	.1	2.3	159	140	8	274	7.3
347	55	20	11		172		58	3		46	292	219	78	444	
363	34	9.1	6.2	1.2	160	0	9.9	2.5	.2	.2	155	122	0	261	7.5
443	54	8.7	3.4		194		12	2.5	.0	3.2	191	170	11	326	7.3
445a	26	8.2	11	.9	140	0	5.5	6.0		.1	147	99	0	235	7.5
462			3.4		128		2.6	7.0	.1	.6		111		223	7.7
494	178	21	15		471		20	65	.0	81	638	530	144	1,040	7.0
522	27	5.1	5.5		94		7.6	5.2	.0	9.9	122	88	12	201	7.8
522a	28	8.3	6.4	1.2	140	0	1.3	1.0	.0	.7	130	104	0	220	7.6
535					136	0	5	2	.0	.6		112		221	7.9
660			2.8		145		1	2	.0	1.1		118		227	8.0
Spring[5]	46	3.5	7.8		162		8.2	3		1.6	166	130	0		
Spring[6]	18	5.5	1.6		76		3.8	2.0	.2	1.3	88	68	5	140	6.5
Spring[7]	37	4.6	5.7	1.0	96	0	40	5.0		1.7	152	112	33	247	6.8

[1] Analyses by Branch of Quality of Water, U.S. Geological Survey.
[2] In solution at time of analysis.
[3] Salt Lake City laboratory No.
[4] Includes the equivalent of 7 ppm CO_3.
[5] Brasil Spring, 3 miles northwest of Palmer.
[6] Bluff overlooking Knik Arm, 2½ miles southeast of Wasilla.
[7] Bluff, Matanuska River half a mile southwest of Wolvering Creek.