

# **Overview of Environmental and Hydrogeologic Conditions at Iliamna, Alaska**

---

U.S. GEOLOGICAL SURVEY

Open-File Report 95-346

Prepared in cooperation with the

FEDERAL AVIATION ADMINISTRATION



# **Overview of Environmental and Hydrogeologic Conditions at Iliamna, Alaska**

By James D. Hall

---

U.S. GEOLOGICAL SURVEY

Open-File Report 95-346

Prepared in cooperation with the  
FEDERAL AVIATION ADMINISTRATION



Anchorage, Alaska  
1995

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

**U.S. GEOLOGICAL SURVEY**  
Gordon P. Eaton, Director

---

For additional information write to:

District Chief  
U.S. Geological Survey  
4230 University Drive, Suite 201  
Anchorage, AK 99508-4664

Copies of this report may be purchased from:

U.S. Geological Survey  
Earth Science Information Center  
Open-File Reports Section  
Box 25286, MS 517  
Federal Center  
Denver, CO 80225-0425

# CONTENTS

Abstract .....	1
Introduction .....	1
Physical setting .....	1
Location.....	1
History and socioeconomics .....	3
Climate .....	3
Vegetation .....	4
Geology .....	4
Bedrock geology .....	4
Surficial deposits.....	5
Permafrost .....	5
Hydrology .....	6
Surface water .....	6
Ground water.....	6
Drinking water sources and water use.....	7
Summary .....	8
References cited.....	8
Appendix 1. Well driller's logs for wells in Iliamna, Alaska.....	A-1
Appendix 2. Well driller's logs for wells in Newhalen, Alaska.....	A-2
Appendix 3. Well driller's logs for wells at the Iliamna FAA facility near Iliamna, Alaska.....	A-3
Appendix 4. Water quality analysis reports for wells in Newhalen, Alaska and at the Iliamna FAA facility .....	A-4

## FIGURES

1. Map showing the location of Iliamna and Newhalen, Alaska and the Iliamna Federal Aviation Administration facility ..... 2

## TABLES

1. Monthly mean and annual temperature, precipitation, and snowfall for the period 1939 to 1987, Iliamna FAA facility, Alaska ..... 4
2. Mean monthly flow at U.S. Geological Survey stream-gaging station 15300000, Newhalen River near Iliamna, Alaska, water years 1952-67 and 1982-86 ..... 6
3. Selected water-quality data from two wells at the Iliamna FAA facility and one well at a U.S. Public Health Service facility in Newhalen, Alaska ..... 8



## CONVERSION FACTORS, VERTICAL DATUM, AND ABBREVIATED WATER-QUALITY UNITS

Multiply	By	To obtain
millimeter (mm)	0.03937	inch
centimeter (cm)	0.3937	inch
meter (m)	3.281	foot
kilometer (km)	0.6214	mile
square kilometer (km <sup>2</sup> )	0.3861	square mile
cubic meter per second (m <sup>3</sup> /s)	35.31	cubic foot per second
cubic meter per second per square kilometer [(m <sup>3</sup> /s)/km <sup>2</sup> ]	91.49	cubic foot per second per square mile
degree Celsius (°C)	$^{\circ}\text{F} = 1.8 \times ^{\circ}\text{C} + 32$	degree Fahrenheit (°F)

### 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 both the United States and Canada, formerly called Sea Level Datum of 1929.

### Abbreviated water-quality unit used in this report:

mg/L, milligram per liter

μS/cm, microsiemens per centimeter at 25 degrees Celsius

# Overview of Environmental and Hydrogeologic Conditions at Iliamna, Alaska

By James D. Hall

## Abstract

The Federal Aviation Administration is conducting preliminary environmental assessments at most of its present or former facilities in Alaska, including Iliamna. The villages of Iliamna, Newhalen, and the Federal Aviation Administration facility in Iliamna, Alaska are near the shore of Alaska's largest fresh-water lake, Iliamna Lake. The climate in this area is transitional from maritime to continental with a mean annual temperature of 1.2 degrees Celsius and a mean annual precipitation of about 675 millimeters. Iliamna Lake is surrounded by a mixed spruce forest growing on deposits of gravel, sand, and silt. These surficial deposits contain ground water and constitute the primary source of drinking water for the area. Alternative sources of drinking water include the Newhalen River and Iliamna and Pike Lakes, as well as numerous other lakes and streams.

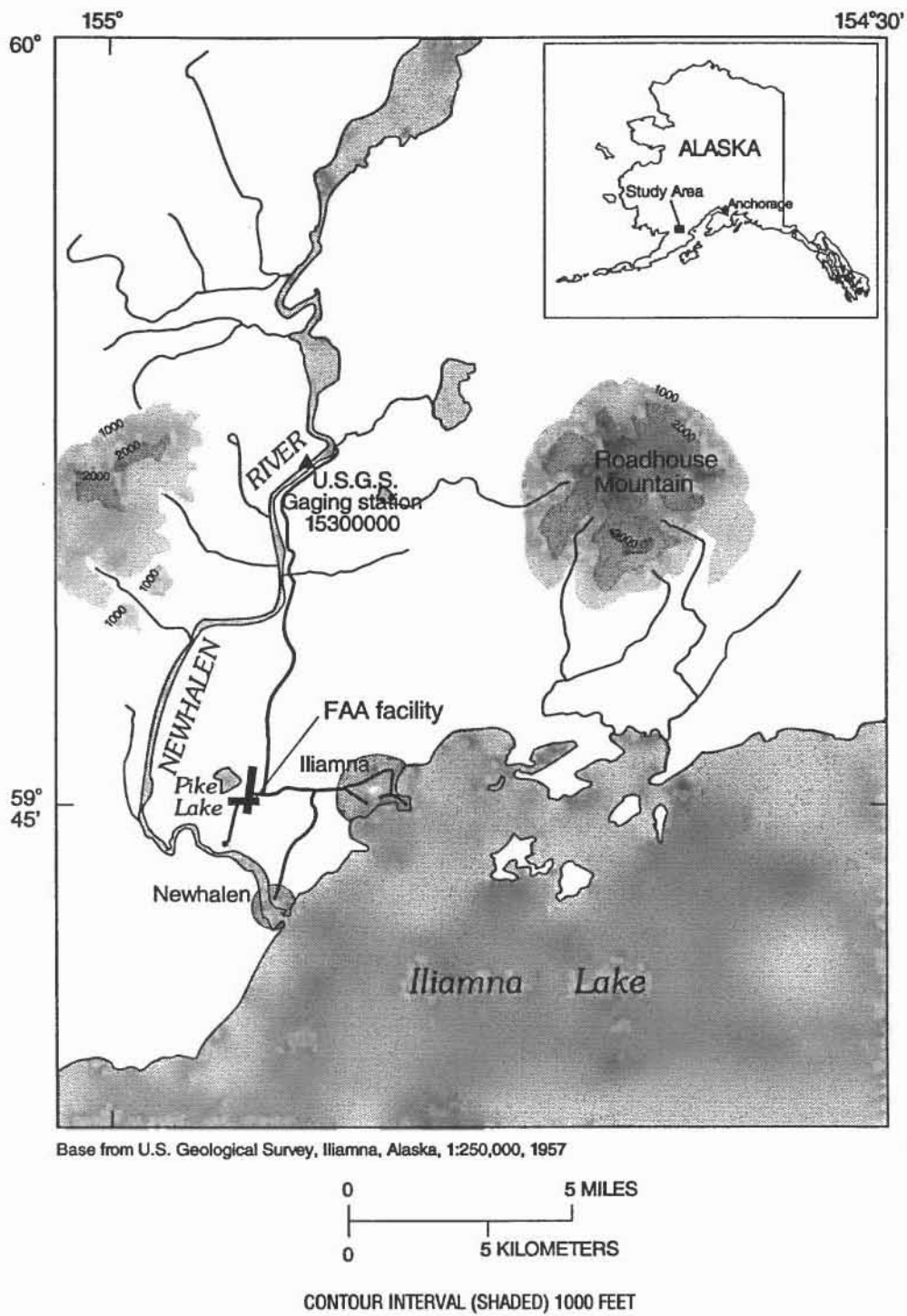
## INTRODUCTION

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 or disposed of. To determine if environmentally hazardous materials have been spilled or disposed of at the sites, the FAA is conducting environmental studies mandated by the Comprehensive Environmental Response, Compensation, and Liability Act and the Resource Conservation and Recovery Act. To complete these more comprehensive environmental studies, the FAA requires supplementary 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 this supplementary information and describes general ground-water conditions, flood hazards, and other environmental conditions for the Iliamna FAA facility and nearby areas at Iliamna, Alaska (fig. 1).

## PHYSICAL SETTING

### Location

Iliamna, Newhalen, and the Iliamna FAA facility are in southwest Alaska near the southern end of the Alaska Range and the northern end of the Aleutian Range (Wahrhaftig, 1965; Selkregg,



**Figure 1.** Location of Iliamna and Newhalen, Alaska and the Iliamna Federal Aviation Administration facility.

1976). The Iliamna FAA facility lies at an elevation of about 44 m (Detterman and Reed, 1973). The facility is near the southeast shore of Pike Lake and about 4 km northwest of Iliamna Lake, Alaska's largest fresh-water lake. The Iliamna FAA facility is about 4 km north of the village of Newhalen, 4 km west of the village of Iliamna, and about 315 km southwest of Anchorage (fig. 1). Access to the area is typically by air, although small boats and shallow draft barges may reach Iliamna or Newhalen. The Iliamna FAA facility, Iliamna, and Newhalen are connected by a local road system.

### **History and Socioeconomics**

The village of Iliamna was established in 1935 when the Tanaina Athabascans moved their village to this location (Selkregg, 1976). The population grew and by 1980 about 94 people lived in the village (Environmental Services Ltd., 1982). The population leveled off during the 1980's and in 1990 the population was still 94 people (U.S. Census Bureau, 1991). The economy of the Iliamna area is based primarily on commercial and sport fishing, hunting, and tourism. In 1990, 9 percent of the workforce was employed in a transportation-related field, which includes FAA services, and most residents added to their income through subsistence hunting and fishing (Alaska Department of Community and Regional Affairs, 1991).

The village of Newhalen was established in the late 1800's primarily because of the fish and game resources in the immediate area. About 90 people lived in Newhalen in 1990, and the village economy was based on fishing. In the summer, many villagers leave Newhalen to fish commercially as a supplement to their local jobs and to their subsistence lifestyle. Local jobs include regional and city government, education, transportation, and some construction (Environmental Services Ltd., 1982).

The FAA first began acquiring land and buildings near Iliamna and Newhalen in 1941, during the World War II defense buildup in Alaska. The Iliamna FAA facility consists of two maintained runways, a low power non-directional beacon, and additional service support buildings (National Oceanic and Atmospheric Administration, 1993). A detailed description of the Iliamna FAA facility is given in an Environmental Compliance Investigation Report by Ecology and Environment, Inc. (1994).

### **Climate**

The Iliamna area has a climate that is transitional between maritime and continental (Hartman and Johnson, 1984). The region experiences cool summers and moderately cold winters. The mean annual temperature is 1.2°C, but temperatures range from a July mean maximum of 16.9°C and a December mean minimum of -12.9°C (Leslie, 1989). Mean annual precipitation is about 675 mm; about 1,534 mm of snow falls annually (Leslie, 1989). Mean monthly and annual temperature, precipitation, and snowfall are summarized in table 1.

**Table 1.** Mean monthly and annual temperature, precipitation, and snowfall for the period 1939 to 1987, Iliamna FAA facility, 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	-5.2	-4.2	-1.4	3.6	9.9	14.9	16.9	15.9	12.2	4.8	-1.1	-5.7	5.1
Maximum	32.8	(June, 1953)											
Mean minimum	-12.3	-12.3	-10.0	-4.6	1.3	5.7	8.7	8.6	5.1	-1.6	-7.5	-12.9	-2.6
Minimum	-43.9	(Jan., 1947)											
Mean	-8.7	-8.2	-5.7	-0.6	5.6	10.4	12.8	12.3	8.7	1.6	-4.2	-9.3	1.2
Precipitation, in millimeters of moisture													Total
	35.1	29.0	32.8	29.0	34.5	42.7	71.4	126.0	107.7	78.7	47.8	42.2	676.9
Snowfall, in millimeters													Total
	264.2	251.5	274.3	157.5	27.9	0.0	0.0	0.0	0.0	66.0	200.7	297.2	1539.3

## Vegetation

Vegetation in the Iliamna area consists mainly of mixed spruce forest and high brush (Detterman and Reed, 1973; Viereck and Little, 1972; Selkregg, 1976). The mixed spruce forest consists of black and white spruce with an understory of shrub tundra and sphagnum (Detterman and Reed, 1973). Open stands of both white and black spruce are present throughout the region (Detterman and Reed, 1973). High brush areas consist of thickets of alders interspersed with willow (Viereck and Little, 1972; Selkregg, 1976). The high brush area understory consists of grasses, fern, herbs, and shrubs (Viereck and Little, 1972; Selkregg, 1976). Aerial photographs of the area around the Iliamna FAA facility at Iliamna indicate that the vegetation is mixed spruce forest to the northwest near Pike Lake and high brush to the north, east, and south.

## GEOLOGY

The Iliamna FAA facility is on a lake terrace north of Iliamna Lake, about 30 m above the present lake surface. Bedrock is exposed in nearby river banks and lake shores (Detterman and Reed, 1980). The mountains to the southeast contain numerous faults. There are more than 15 volcanic necks or plugs within 50 km of the Iliamna FAA facility (Detterman and Reed, 1980). Bedrock is overlain primarily by gravel and sand (Detterman and Reed, 1973).

### Bedrock Geology

Bedrock near Iliamna was mapped by Detterman and Reed (1980) and consists primarily of volcanic rocks of Tertiary age. Outcrops of basalt, andesite and volcanic breccia are common along stream banks and the shore of Iliamna Lake. To the northeast on Roadhouse Mountain, bedrock consists of about 70 percent volcanic rocks and about 30 percent intrusive igneous rocks. The volcanic rocks of Roadhouse Mountain are composed of tuft interbedded with basalt and andesite

lava flows, whereas the intrusive rocks consist of granodiorite and quartz diorite. Roadhouse Mountain is the remnant of a large volcano which produced the tuffs and lava flows exposed along the north side of Iliamna Lake.

Drillers' logs<sup>1</sup> for wells in the area indicate that bedrock is commonly present at depths of less than 10 m (Appendix 1 and 2). In the village of Iliamna, one well drilled to a depth of about 82 m indicated solid rock at a depth of 6 m below the ground surface (Hutchison, 1979a). In Newhalen, a series of wells reached bedrock at depths between 4.5 m and 10 m below the ground surface (Hutchison, 1979b). At the Iliamna FAA facility, well logs indicate that bedrock is 16 m to 18 m below the ground surface (Appendix 3).

### Surficial Deposits

The surficial deposits near Iliamna were mapped by Detterman and Reed (1973). Near the Iliamna FAA facility, these deposits consist of lake terrace and beach ridge deposits. Prominent terraces and beach ridges are present at about 12 m, 24 m, 30 m, and 40 m above the 1965 lake elevation. Shallow pits excavated into lake terraces at various points around Iliamna Lake exposed a variety of volcanic ash deposits and beach sediment (Detterman and Reed, 1973). The beach sediment generally consists of layers of dark yellowish quartz sand, silt, and a yellow brown loam that overlie poorly sorted gravel and till.

One driller's log from Iliamna indicates that the surficial deposits are primarily coarse sand to about 2.5 m below the surface and angular bedrock rubble about 6 m below the surface (Hutchison, 1979a). Other logs indicate the presence of gravel overlying bedrock (Appendix 1). In the Newhalen area, surficial deposits are described in well logs (Appendix 2) as primarily clay<sup>2</sup> deposits intermixed near the surface with gravel, sand, and mud. At the Iliamna FAA facility, well logs indicate that surficial deposits consist of poorly sorted gravel, sand, and clay (Appendix 3).

### Permafrost

Permafrost in this area of Alaska is generally found in isolated thin lenses at shallow depth and as relict permafrost at considerable depth below the surface (Ferrians, 1965). In the town of Iliamna, drillers' logs indicate unfrozen ground to a depth of 123 m (Appendix 4). At the Iliamna FAA facility, well logs indicate the absence of permafrost to a depth of 39 m (Appendix 3). Permafrost is generally absent in areas adjacent to or beneath large lakes and rivers (Hopkins and others, 1955). Absence of shallow permafrost at Iliamna is likely because the mean annual temperature is above freezing and Iliamna Lake is nearby.

---

<sup>1</sup>Information garnered from well drillers' logs about geology and hydrology at a well site varies in accuracy depending on the driller. The quality of most of the drillers' logs noted in this report is unknown and drillers' vernacular may not be consistent with terms as they are used by geologists. When possible, logs of wells drilled by the U.S. Geological Survey will be used, as the level of accuracy is consistently good.

<sup>2</sup>The presence of pure clay in the region is possible but unlikely. Rather, it is probably silt intermixed with some clay-size particles (C. F. Waythomas, U.S. Geological Survey, oral commun., 1995). The permeability of these particles remains undetermined.



## HYDROLOGY

### Surface Water

Within about 5 km of Iliamna there are more than 50 lakes and ponds. Iliamna Lake is about 380 m deep and its surface is about 14 m above sea level (Detterman and Reed, 1973). The lake is enclosed on its western end by a moraine of late Pleistocene age (Detterman and Reed, 1973). Iliamna Lake is fed by numerous tributary streams, the largest of which is the Newhalen River. Many lakes and streams near the Iliamna FAA facility are used for subsistence fishing and recreation.

The Newhalen River flows about 1.5 km south of the Iliamna FAA facility. It drains an area of about 9,000 km<sup>2</sup> upstream from the U.S. Geological Survey stream-gaging station 15300000, which lies about 12 km northwest of the Iliamna FAA facility (fig. 1; U.S. Geological Survey, 1988). Mean daily discharge of the Newhalen River near Iliamna was reported from October 1951 to September 1967 and from October 1981 to September 1986. Monthly mean and mean annual discharge for the period of record are summarized in table 2. Monthly mean discharge for the period of record (water years 1952-67 and 82-86) ranged from an August 1967 maximum of 846 m<sup>3</sup>/s and a February-March 1956 minimum of 28.3 m<sup>3</sup>/s. The mean annual discharge for the period of record was 262 m<sup>3</sup>/s.

**Table 2.** Monthly mean flow at U.S. Geological Survey stream-gaging station 15300000, Newhalen River near Iliamna, Alaska, water years 1952-67 and 1982-86

[Values in cubic meters per second (m<sup>3</sup>/s)]

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
Mean	342	185	112	81.1	62.9	58.5	60.8	126	387	581	604	518
Monthly mean maximum	564 (1962)	309 (1958)	181 (1958)	130 (1958)	99.9 (1984)	94.4 (1984)	92.6 (1984)	181 (1953)	559 (1964)	735 (1985)	846 (1967)	720 (1961)
Monthly mean minimum	202 (1985)	96.3 (1956)	51.0 (1956)	34.0 (1956)	28.3 (1956)	28.3 (1956)	34.0 (1960)	69.3 (1964)	230 (1986)	455 (1954)	441 (1983)	271 (1983)
Annual mean: 262												

Both Iliamna and Newhalen have a low flood hazard and do not participate in national flood insurance programs (U.S. Army Corps of Engineers, 1993). The town of Iliamna did experience storm-surge flooding in 1969 and 1970; However, there are no records of flooding at Newhalen (U.S. Army Corps of Engineers, 1993). The Iliamna FAA facility is at a higher elevation than either Iliamna or Newhalen and should also have a low flood hazard.

### Ground Water

Ground water is found in unconsolidated surficial deposits and in fractured bedrock under Iliamna, Newhalen, and the Iliamna FAA facility. Drillers' logs indicates layers of "clay" or layers of "clay" intermixed with coarser deposits (Appendix 1, 2, and 3; Hutchison, 1979a). However, the data are inadequate to determine if these strata are impermeable enough to separate the surficial deposits into different aquifers. Near Iliamna, sand and gravel deposits about 10 m below the surface contain ground water (Appendix 1; Hutchison, 1979a). Ground water also has been

obtained at a depth of about 30 m in fractured bedrock, at a depth of about 44 m in sand, and at a depth of 61 m to 67 m in fractured bedrock (Appendix 1; Hutchison, 1979a). Near Newhalen, ground water has been obtained in the sand and gravel of the beach deposits around Iliamna Lake (Appendix 2; Hutchison, 1979b) and from fractured bedrock 75 m below the land surface (Appendix 2; Hutchison, 1979b). Two wells at the Iliamna FAA facility obtained ground water at depths of 6 m and 18 m (Appendix 3).

### **Drinking Water Sources and Water Use**

Ground water is the primary source of public-water supplies in Iliamna, Newhalen, and at the Iliamna FAA facility (Appendix 2, 3; Hutchison, 1979a, b). However most residents have private wells which augment or replace the water supplied by the public wells. Surface water is also a readily available source of drinking water. The close proximity of surface-water supplies (such as Iliamna Lake, Pike Lake, and the Newhalen River) to Iliamna, Newhalen, and the Iliamna FAA facility provide alternative sources of drinking water. The data available are inadequate to characterize the quantity or quality of these sources.

In Iliamna, most drinking water is obtained from private wells. Although a public access well is available, there are no public drinking water treatment facilities or distribution systems (Norman L. Fairbanks, U.S. Public Health Service, oral commun., 1995). Treatment of drinking water is done on an individual basis by personal choice rather than by need (Norman L. Fairbanks, U.S. Public Health Service, oral commun., 1995).

In Newhalen, water is distributed from the public-water supply wells to the public facilities, such as the Washeteria, the school, the health clinic, and to the U.S. Department of Health and Human Services, Housing and Urban Development (HUD) housing facilities (Lowdermilk, 1986). However, most residents obtain water from their private wells or individually transport it to their place of residence from Iliamna Lake or the Newhalen River (Norman L. Fairbanks, U. S. Public Health Service, oral commun., 1995). A water-treatment system was installed in 1990 for the fluoridation and chlorination of the HUD housing facilities' water supplies, but it is presently not in use (Norman L. Fairbanks, U.S. Public Health Service, oral commun., 1995).

Water-quality analyses of water from wells in Iliamna (Hutchison, 1979a) and Newhalen (Appendix 4) indicate an iron concentration greater than the U.S. Environmental Protection Agency's Secondary Maximum Contaminant Levels (U.S. Environmental Protection Agency, 1995). The reported concentration of iron in water from wells in Iliamna, in conjunction with a low or high pH and (or) a high specific conductance, will cause corrosion in the well and distribution system. These high iron concentrations can stain plumbing fixtures and affect the taste of the water, but are not hazardous to humans (Appendix 4; Johnson, 1966). In 1958, the U.S. Geological Survey sampled water from two wells at the Iliamna FAA facility. Table 3 shows the reported concentrations of iron and major ions, as well as specific conductance and pH (Appendix 4).



**Table 3. Selected water-quality data from wells in Iliamna, Newhalen, and at the Iliamna FAA facility**  
 [All data in milligrams per liter, unless indicated;  $\mu\text{S}/\text{cm}$ , microsiemens per centimeter at 25°Celsius; USPHS, U.S. Public Health Service]

Constituent (or property)	Regulated contaminant levels <sup>a</sup>	Newhalen USPHS well (1982)	Newhalen USPHS well (1984)	Iliamna USPHS well (1979 <sup>b</sup> )	USFAA1 well	USFAA2 well
Sodium (Na)	---	1.4	15.0	24.0	8.0	2.6
Sulfate ( $\text{SO}_4$ )	500 <sup>c</sup>	1.5	4.2	2.0	0.0	3.0
Fluoride (F)	4.0 <sup>d</sup>	<0.1	---	---	0.0	0.1
Chloride (Cl)	250 <sup>e</sup>	<1.0	4.0	4.0	5.0	1.5
Iron (dissolved; Fe)	0.3 <sup>e</sup>	.40	1.1	2.0	.05	0.0
pH (units)	6.5 - 8.5 <sup>e</sup>	5.4	8.4	8.7	5.5	7.0
Specific conductance ( $\mu\text{S}/\text{cm}$ )	---	20	95	120	110	62

<sup>a</sup>From U.S. Environmental Protection Agency, 1995.

<sup>b</sup>From Hutchinson, 1979a.

<sup>c</sup>Maximum Contaminant Level.

<sup>d</sup>Maximum Contaminant Level-Under Review.

<sup>e</sup>Secondary Maximum Contaminant Level.

## SUMMARY

The Iliamna FAA facility is located on a northern lake terrace of Iliamna Lake, Alaska's largest fresh-water lake, near the southern end of the Alaska Range and the northern end of the Aleutian Range. Iliamna has a mean annual temperature of 1.2°C and a mean annual precipitation of about 675 mm. This climate supports mixed spruce forest and high brush vegetation. The surficial geology near the FAA facility is characterized by 16-to-18-m-thick of poorly sorted sediments overlying volcanic rock. Ground water, the primary source of drinking water for the Iliamna FAA facility, is found at depths between 6 and 18 m in both the sand and gravel aquifer and within the fractured bedrock. Abundant local surface-water sources such as Iliamna Lake, Pike Lake, and the Newhalen River represent alternative drinking-water supplies. However, data are inadequate to characterize the quantity or quality of these sources.

## REFERENCES CITED

- Alaska Department of Community and Regional Affairs, 1991, Iliamna community profile: Municipal and Regional Assistance Division - Community Database, Juneau, Alaska, variously paged.
- Detterman, R.L., and Reed, B.L., 1973, Surficial deposits of the Iliamna quadrangle, Alaska; (Geology of the Iliamna quadrangle, Alaska): U.S. Geological Survey Bulletin 1368-A, 64 p.

- \_\_\_\_\_. 1980, Stratigraphy, structure, and economic geology of the Iliamna quadrangle, Alaska -- A comprehensive study of Mesozoic to Holocene sedimentary, volcanic, and plutonic rocks of the Iliamna quadrangle (Geology of the Iliamna quadrangle Alaska: U.S. Geological Survey Bulletin 1368-B, 86 p.
- Ecology and Environment, Inc., 1994, Environmental compliance investigation report, Iliamna FAA Station, Iliamna, Alaska: Anchorage, [Copy available through the Environmental Compliance Section AAL-465 Federal Aviation Administration, Alaska Region, variously paged].
- Environmental Services Ltd., 1982, Alaska Peninsula -- Iliamna Lake community profiles: Alaska Department of Community and Regional Affairs, Division of Community Planning, 14 sheets.
- Ferrians, O.J., 1965, Permafrost map of Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-445, 1 sheet, scale, 1:2,500,000.
- Hartman, C.W., and Johnson, P.R., 1984, Environmental atlas of Alaska: University of Alaska Fairbanks, Institute of Water Resources/Engineering Experiment Station, 95 p.
- Hopkins, D.M., Karlstrom, T.N.V., and others, 1955, Permafrost and ground water in Alaska: U.S. Geological Survey Professional Paper 264-F, 146 p.
- Hutchison, J., 1979a, Water well analysis sanitation facilities construction - Iliamna, Alaska: Alaska Area Native Health Service-Environmental Health Branch, Project No. AN-77-625E, variously paged.
- \_\_\_\_\_. 1979b, Water well analysis sanitation facilities construction - Newhalen, Alaska: Alaska Area Native Health Service-Environmental Health Branch, Project No. AN-78-635, variously paged.
- Johnson, E.E., 1966, Ground water and wells: Saint Paul, Minn., Johnson Division, 440 p.
- Leslie, L.D., 1989, Alaska climate summaries (2d ed.): University of Alaska Anchorage, Arctic Environmental Information and Data Center, Alaska Climate Center Technical Note No. 5, variously paged.
- Lowdermilk, 1986, Newhalen, Alaska (aerial photo): U.S. Department of Health and Human Services, Public Health Service, Indian Health Service, Project No. AN-86-347, 1 Sheet.
- Selkregg, L., 1976, Alaska regional profiles--southwest region: University of Alaska, Arctic Environmental Information and Data Center, 313 p.
- U.S. Army Corps of Engineers, 1993, Alaskan communities--Flood hazard data: U.S. Army Corps of Engineers, Alaska District, 335 p.
- U.S. Census Bureau, 1991, Percent distribution Alaska population by sex, race, and Hispanic origin--1990 census: Alaska Department of Labor, Research, and Analysis, 3 p.
- U.S. Environmental Protection Agency, 1995, Drinking water regulations and health advisories: USEPA, May 1995 publication 11 p.
- U.S. Geological Survey, 1988, Water resources data for Alaska, water year 1987: U.S. Geological Survey Water-Data Report AK-87-1, 284 p.
- Viereck, L.A., and Little, E.L., Jr., 1972, Alaska trees and shrubs: U.S. Department of Agriculture, Forest Service, Agriculture Handbook No. 410, 265 p.
- Wahrhaftig, C., 1965, Physiographic divisions of Alaska: U.S. Geological Survey Professional Paper 482, 52 p.

---

---

## **APPENDIX 1**

Well drillers logs for wells in Iliamna, Alaska

---

---

SITE NO. SC 5-33-12 CARRI-3

Recorded by Stare 9-10-92U.S. DEPT. OF THE INTERIOR  
GEOLOGICAL SURVEY  
WATER RESOURCES DIVISION  
SITE SCHEDULECheck One ☒ English ☐ Metric UnitsTransaction T (A) D M Y \*  
add, delete, modify, verified

## GENERAL SITE DATA (1)

Site Ident No 59,4528 15,449,120,1 RG Number R-0 \* Reporting Agency 4- U.S.G.S. \*

Site-Type 2- C D E H I M O P S T (W) X \* Data Reliability 3- C (U) L M \*  
 collector, drain, secrete sink, connector multiple, outcrop, pond, spring, tunnel, well, test hole, or shaft, hole, well, accurate data

Project No. 5- LK, R, PEN, S, LK \* District 6- 02 \* State 7- 02 \* County (for town) 8- 16A \*

Latitude 9- 59 45 28 \* Longitude 10- 154 49 12 \* Lat-Long Accuracy 11- S F T M \*  
 deg min sec deg min sec sps, 3 sec, 10 sec, 1 min

Local Number 12- 512005033 12, 0A, 0A, 1, 2, 33 \* Land Net Loc. 13- NW, NE, SE, S, 1, 2, T, O, O, S, R, 9, 3, 4, S \*  
 1/4 1/4 1/4 section, township, range, meridian

Location Map 14- 2, L, i, a, m, N, a, D-5 \* Scale 15- 1:63,360 \*

Altitude 16- 75 \* Method of Measurement 17- A L (M) \* Accuracy 18- 25 \*  
 altimeter, level, map

Topo Setting 19- A B C D E F G H K L M O P S T U V W \* Hydrologic Unit (IOWDC) 20- 19, 040, 972 \*  
 alluvial, plays, stream, depress, dunes, flat, flood hill, sink, swamp, mangrove, off-ped, hill, terrace, undulating, valley, island, at fan, channel, dion, plain, top, swamp, shore, mont, slide, flat, draw

Use of Site 23- A C D E G H M O P R S T U (W) X Z \* Secondary Site Use 301- \* Tertiary Site Use 302- \*  
 anode, standby, drain, geo, seismic, heat, mine, observe all or, recharge, repress, test, unused, with-waste, destroyed, drawal, emer, supply, thermal, reservoir, gas

Use of Water 24- A B C D E F (H) I J K M N P Q R S T U Y Z \*  
 air-cond, hot, steam, cooling, de, power, fire, domestic, irrigation, industrial, min, medicinal, industrial, public, aqua, recreation, stock, institution, unused, desal, other

Secondary Water Use 25- \* Tertiary Use 26- \* Depth of Hole 27- 205 \* Depth of Well 28- 205 \* Source of Depth Data 29- d \*

Water Level 30- \* Data Measured 31- / / \* Source 33- \*  
 month day year

Method of Measurement 34- A B C E G H L M N R S T V Z \*  
 airline, analog, calibrated, estimated, pressure, calibrated, geophysical, manometer, non-rec, reported, steel, electric, calibrated, other, gauge, pressure gauge, logs, tape, electric tape

Site Status 37- D E F G H I J N O P R S T V W X Z \*  
 dry, recently, flowing, nearby, injector, in-situ, meas., obstruction, pumping, recently, nearby, nearby, foreign, well, surface water, other, flowing, flowing, recently, site, monitor, discon., pumped, pumping, recently, substance, destroyed, pumped, effects

Source of Geohydrologic Data 36- 3 \* Pump Used 35- \* Date of First Construction/Completion 21- 04 / 12 / 1979 \*  
 month day year

## OWNER IDENTIFICATION (1)

R-158 \* T- A D M \* Date of Ownership 158# 04 / 12 / 1979 \*  
 add, delete, modify month day year

Name: Last 161# Hedlund, Linda \*

R-158 \* T- A D M \* Date of Ownership 158# / / \*  
 add, delete, modify month day year

Name: Last 161- \*

## OTHER SITE IDENTIFICATION NUMBERS (1)

R-188 \* T- A D M \* 188# 129 \* Assigner 191- L, K, R, W, A, C, R, S \*  
 add, delete, modify

R-188 \* T- A D M \* 188# B, ed, R, o, c, k \* Assigner 191- unknown \*

R-188 \* T- A D M \* 188# 90, 97, 71 \* Assigner 191- L, A, S \*

R-188 \* T- A D M \* 188# \* Assigner 191- \*

## SITE VISIT DATA (1)

R-188 \* T- A D M \* Date of Visit 187# / / \* Name of Person 188- \*  
 add, delete, modify month day year

## PERTINENT REMARKS (1)

R-183 \* T- A \* 185- \*  
 New Card Same R&T

185- \*

185- \*

A D G L M O R S Z

① Source of Data Codes: other, driller, geologist, logs, memory, owner, other, reporting, other, survey, source

Hedlund well

JOHNNY HEDLUND

Iliamna, AK.

SETUP 3-31-79

TEAR DOWN 4-12-79

STRATUM

CASING

0-1	GRAVEL FILL	10-3 1/2
1-6	ORGANICS	10-1/4
6-18	GREY SANDSTONE	20-33 1/4
18-23	HARD SANDSTONE	10-7/8
23-30	SOFT SANDSTONE	30-45/8
30-33	HARD CLAY	10-1
33-40	SOFT SANDSTONE	40-55/8
40-43	FLOWING SANDSTONE	10-1/2
43-45	ROCK	50-6 1/8
45-58	FLOWING SANDSTONE + GRAVEL	10-1/8
58-76	SANDSTONE + GRAVEL	60-6 1/4
76-104	ROCK	10-1 1/8
104-112	HARD ROCK	70-7 3/8
112-175	SOFT ROCK	10-0
175-205	SOFT ROCK (WATER)	80-7 3/8
		10-3/8
		90-7 3/4
		10-0
		100-7 3/4
		10-1/8
		110-7 7/8
		10-1
		120-8 7/8
		10-1
		130-9 7/8
		10-0
		140-9 7/8

BAIL TEST -

Lot 29, Lake View Acres Subd

140' - 2 GPM

owner: Linda Hedlund

150' - 5 GPM

Box 185

Iliamna, AK 99606

175' - 6 GPM

205' - 10 GPM PLUS

well in NE 1/4 NW 1/4 NE 1/4 SW 1/4 Sec 12,

LAS 9771

T 5S, R 33W, S 1M N 36 W 54

cc: DGGs

LOCAL NO. SC 5-00-16 UHPT  
SITE ID 594528154491201

Hedlund Well

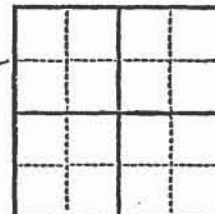
UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY  
WATER RESOURCES DIVISION

122-5

WELL SCHEDULE

Date 9/23, 1962 Field No. 22  
Record by Williams Office No. \_\_\_\_\_  
Source of data Owner

1. Location: State \_\_\_\_\_ County \_\_\_\_\_  
Map \_\_\_\_\_  
\_\_\_\_\_  $\frac{1}{4}$  \_\_\_\_\_  $\frac{1}{4}$  sec. \_\_\_\_\_ T \_\_\_\_\_ N \_\_\_\_\_ S \_\_\_\_\_ R \_\_\_\_\_ E \_\_\_\_\_ W \_\_\_\_\_
2. Owner: Oron B. Hudson Address Umanna Alaska  
Tenant None Address \_\_\_\_\_  
Driller \_\_\_\_\_ Address \_\_\_\_\_
3. Topography base of low hill
4. Elevation 20 ft. above Umanna lake  
below \_\_\_\_\_
5. Type: Dug, drilled, driven, bored, jetted \_\_\_\_\_ 19 -
6. Depth: Rept. 22 ft. Meas. \_\_\_\_\_ ft.  
well cut 3 x 3 1/2 ft
7. Casing: Diam. \_\_\_\_\_ in., to \_\_\_\_\_ in., Type \_\_\_\_\_  
Depth \_\_\_\_\_ ft., Finish \_\_\_\_\_
8. Chief Aquifer \_\_\_\_\_ From \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Others \_\_\_\_\_
9. Water level \_\_\_\_\_ ft. rept. \_\_\_\_\_ 19 \_\_\_\_\_ above  
meas. \_\_\_\_\_ below \_\_\_\_\_  
\_\_\_\_\_ which is \_\_\_\_\_ ft. above  
below surface
10. Pump: Type \_\_\_\_\_ Capacity \_\_\_\_\_ G. M.  
Power: Kind \_\_\_\_\_ Horsepower \_\_\_\_\_
11. Yield: Flow \_\_\_\_\_ G. M., Pump \_\_\_\_\_ G. M., Meas., Rept. Est. \_\_\_\_\_  
Drawdown \_\_\_\_\_ ft. after \_\_\_\_\_ hours pumping \_\_\_\_\_ G. M.
12. Use: Dom., Stock, PS., RR., Ind., Irr., Obs. adequate  
Adequacy, permanence \_\_\_\_\_
13. Quality Fair Temp \_\_\_\_\_ °F.  
Taste, odor, color \_\_\_\_\_ Sample Yes \_\_\_\_\_ No \_\_\_\_\_  
Unfit for \_\_\_\_\_
14. Remarks: (Log, Analyses, etc.) \_\_\_\_\_  
over



Hudson Well

- 0 - pea gravel  
rock chips  
1 1/2 ft grumbo  
beach gravel  
with water
- 22 - grumbo



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

DRILLING LOG

Well Owner Ray Loesche - Rainbow King Lodge Use of Well Dom

Location (address of; Township, Range, Section, if known; or distance main road)  
Iliamna Alaska

Size of casing 6 Depth of Hole 143 feet Cased to 18 feet

Static water level 10 ft. (above) (below) land surface. Finish of well (check one) open end ( X );

Screen ( ) ; Perforated ( ) .

Describe screen or perforation None

Well pumping test at 12 gallons per (hour) (minute) for 1 hours with 100% ft.  
of drawdown from static level.

Date of completion 4 July 73

WELL LOG

Depth in feet from ground surface	Give details of formations penetrated, size of material, color and hardness
<u>0 TO 5</u>	<u>Sand: fine, silty</u>
<u>5 TO 10</u>	<u>Gravel: small</u>
<u>10 TO 14</u>	<u>Gravelly Clay</u>
<u>14 TO 28</u>	<u>Bedrock: volcanic (1 GPM @ 28' water)</u>
<u>28 TO 35</u>	<u>" " Gray</u>
<u>35 TO 45</u>	<u>" " Brown</u>
<u>45 TO 47</u>	<u>" " Red</u>
<u>47 TO 60</u>	<u>Brown</u>
<u>60 TO 62</u>	<u>Green</u>
<u>62 TO 80</u>	<u>Grey Green</u>
<u>80 TO 140</u>	<u>" "</u>
<u>140 TO 143</u>	<u>Brown</u>
<u>143 TO</u>	<u>Sand: good waterbearing</u>
<u>TO</u>	
<u>TO</u>	

*Wayne B. Kestring*  
Wayne B. Kestring

2 - State

Loesche Well



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

**DRILLING LOG**

Well Owner Mr. Leonard McMillen Use of Well Dom

Location (address of: Township, Range, Section, if known; or distance main road)  
L31, Lake View Acres Subdivision  
Illiamna, Alaska

Size of casing 6 Depth of Hole 108 feet Cased to 96 feet (from grnd level)

Static water level 15 ft. (above) (below) land surface. Finish of well (check one) open end ( ☒ );  
Screen ( ☐ ); Perforated ( ☒ ).

Describe screen or perforation Four (4) 1/2" B. shot perforation/ft. 81-82 ft. level

Well pumping test at 6 gallons per (hour) (minute) for 1 hours with 71 ft.  
of drawdown from static level.

Date of completion 17 Sep 73

**WELL LOG**

Depth in feet from ground surface	Give details of formations penetrated, size of material, color and hardness
<u>0 TO 5</u>	<u>Open</u>
<u>5 TO 12</u>	<u>Boulder Gravel</u>
<u>12 TO 30</u>	<u>Silty Clay</u>
<u>30 TO 32</u>	<u>Sandy Clay - wet</u>
<u>32 TO 40</u>	<u>Silty Sand</u>
<u>40 TO 80</u>	<u>Clayey Sand - wet</u>
<u>80 TO 83</u>	<u>Pos Gravel: waterbearing</u>
<u>83 TO 97</u>	<u>Hardpan Clay</u>
<u>97 TO 108</u>	<u>Weathered Bedrock: volcanics, becoming more competent 106';</u> <u>some water in weathered fractures</u>
<u>TO</u>	
<u>TO</u>	
<u>TO</u>	
<u>TO</u>	
<u>TO</u>	
<u>TO</u>	

*Wayne E. Restberg*  
Wayne E. Restberg

McMillen Well <sup>2 - State</sup>

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

**DRILLING LOG**

Well Owner Dick Sjoden Use of Well Dom

Location (address of: Township, Range, Section, if known; or distance main road)  
Iliamna Lake Lodge

Size of casing 6 Depth of Hole 196 feet Cased to 10 feet

Static water level 15 ft. (above) (below) land surface. Finish of well (check one) open end ( x );  
Screen (    ); Perforated (    ).

Describe screen or perforation None

Well pumping test at 15 gallons per (hour) (minute) for 1 hours with 100% ft.  
of drawdown from static level.

Date of completion 7 Aug 73

**WELL LOG**

Depth in feet from ground surface	Give details of formations penetrated, size of material, color and hardness
<u>0</u> TO <u>7</u>	<u>Overburden</u>
<u>7</u> TO <u>16</u>	<u>Bedrock; blue gray volcanics, fractured; polluted surface</u> <u>water @ 12' - this was cased off with 4" liner &amp; cement</u> <u>after well drilled to T.D.</u>
<u>16</u> TO <u>87 57</u>	<u>Bedrock; s/s, no water</u>
<u>87</u> TO <u>117</u>	<u>" light green volcanics</u>
<u>117</u> TO <u>140</u>	<u>" Multi-colored "</u>
<u>140</u> TO <u>154</u>	<u>" Blue gray, very hard</u>
<u>154</u> TO <u>158</u>	<u>" Brown, medium hard</u>
<u>158</u> TO <u>160</u>	<u>" black gray, very hard</u>
<u>160</u> TO <u>192</u>	<u>" Brown, soft</u>
<u>192</u> TO <u>195</u>	<u>" Black gray, very hard</u>
<u>195</u> TO <u>196</u>	<u>" Gray green, slightly clayey; " " " "</u>
<u>TO</u>	
<u>TO</u>	
<u>TO</u>	

*Kenneth E. Vestberg*  
Supt. of Drilling

Sjoden Well <sup>2 - State</sup>

---

---

## **APPENDIX 2**

Well driller's logs for wells in Newhalen, Alaska

---

---



WELL SCHEDULE  
U. S. DEPT. OF THE INTERIOR K.P. GEOLOGICAL SURVEY

WATER RESOURCES DIVISION

## MASTER CARD

Record by ANF Source of data BIA Date 11-14-69 Map Illiamna (C-C)  
State Alaska County (or town) Newhalen F.K.  
Latitude: 59 43 20 N Longitude: 154 53 40 Sequential number: 1  
Lat-long accuracy: 4 5 33 Sec 21 SW t. SE t. SEWARD  
Local well number: SC00503321DDCC Other number: B & H  
Local use: 80027 Owner or name: BIA  
Owner or name: BIA NEWHALEN Address: Newhalen  
Ownership: County, (C) Fed Gov't, (F) City, Corp or Co, Private, (N) State Agency, (S) Water Dist, (W) F  
Use of water: (A) Air cond, (B) Bottling, (C) Comm, (D) De-water, (E) Power, (F) Fire, (G) Dom, (H) Irr, (I) Mod, (J) Ind, (K) P S, (L) Rec, (M) Stock, (N) Instit, (O) Unused, (P) Re-pressure, (Q) Recharge, (R) Desal-P S, (S) Desal-other, (T) Other P  
Use of well: (A) Anode, (B) Drain, (C) Seismic, (D) Heat Res, (E) Obs, (F) Oil-gas, (G) Recharge, (H) Test, (I) Unused, (J) Withdraw, (K) Waste, (L) Destroyed, (M) Other U  
DATA AVAILABLE: Well data 70 Freq. W/L meas.: 71 Field aquifer char. 72  
Hyd. lab. data: 73  
Qual. water data: type: Comp # 7022 74  
Freq. sampling: 75 Pumpage inventory: yes 76 no: period: 77  
Aperture cards: 78 79  
Log data: 80

## WELL-DESCRIPTION CARD

Same as on Master Card Depth well: 65 12 ft 65 Meas. rept. 6  
Depth cased: 19 ft 20 Casing type: 21 accuracy 22  
Finish: (C) porous concrete, (F) gravel w. (G) gravel w. (H) horiz. open (I) perf., (J) screen, (K) sd. pt., (L) shored, (M) open hole, (N) other 31  
Method: (A) air bored, (B) cable, (C) dug, (D) hyd jetted, (E) air reverse, (F) trenching, (G) driven, (H) drive, (I) rot., (J) percussion, (K) rotary, (L) wash, (M) other 32  
Date: 33 34 Pump intake setting: 35 ft 36 37  
Driller: 38  
Lift (type): (A) air, (B) bucket, (C) cent, (D) jet, (E) multiple, (F) multiple, (G) nose, (H) piston, (I) rot, (J) submerg, (K) turb, (L) other 39 Deep 40  
Power (type): (A) diesel, (B) elec, (C) gas, (D) gasoline, (E) hand, (F) gas, (G) wind, (H) H.P., (I) Trans. or meter no. 41  
Descrip. MP 42 ft below LSD, Alt. MP 43  
Alt. LSD: 44 Accuracy: (source) 45  
Water Level: 46 ft below MP; 47 ft below LSD Accuracy: 48  
Date meas: 49 Yield: 50 gpm 51 Method determined 52  
Drawdown: 53 ft 54 Accuracy: 55 Pumping period 56 hrs 57  
QUALITY OF WATER DATA: Iron 58 ppm 59 Sulfate 60 ppm 61 Chloride 62 ppm 63 Hard. 64 ppm 65  
Sp. Conduct 66 K x 10<sup>6</sup> 67 Temp. 68 °F 69 Date sampled 70 71  
Taste, color, etc. 72 73

This depth does not match any BIA school wells. See drawing in AKR 80026 schedule.



Mustard  
 just. Sept.  
 Winchester, Mass

New Haven, Conn  
 April 26 1962

Well at New Haven School

GEOLOGICAL SURVEY  
 WATER RESOURCES DIVISION

WELL SCHEDULE

Date: June 6  
 Record by: [illegible]  
 Source of data: [illegible]

Location: [illegible]

Map: [illegible]

Owner: [illegible]

Test: [illegible]

Field No. [illegible]

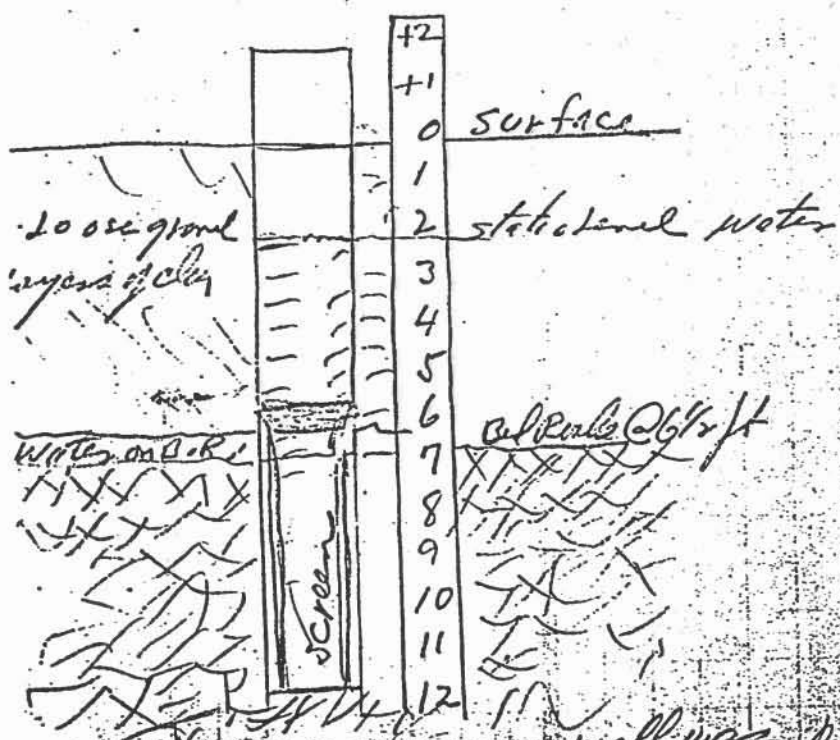
Access No. [illegible]

School Bldg -

Back door

⊗ well

slope of land 2 1/2 to 3% slope



pumped for 17 hrs continuous  
 No decline in water table  
 water crystal clear  
 200 gpm hr.

Sam Hatten

well was pumped with suction pump  
 1/4 H.P. blower to school  
 Teacher to let pump for at least one week  
 or more.

USBIA1

LONG FORM  
Ground-water Site Visit Field Notes  
U.S.G.S. - W.R.D., Alaska 1977  
System 2000 updated on \_\_\_\_\_

AGENCY FILE NO. \_\_\_\_\_

GWSI SITE ID \_\_\_\_\_

LOCAL WELL DESIGNATION Hole #4

VISITED BY Deauren, Patrick

AGENCY \_\_\_\_\_ 07121978

Mo. Day Year

INITIAL SITE; INFO ☒, VISIT ☒

PURPOSE OF VISIT: (circle) field inventory, water level, water quality, geophysical logging,  
survey levels, verify location, other

Site Register Numbers

A.D.L. \_\_\_\_\_

A.D.G.&G.S. \_\_\_\_\_

A.D.E.C. \_\_\_\_\_

U.S.G.S. \_\_\_\_\_

WELL DESCRIPTION AND CONSTRUCTION

OWNER: 1st BIA School, now \_\_\_\_\_ as of mo. \_\_\_\_\_ yr. \_\_\_\_\_

LOCATION: Community or area Newhalen \_\_\_\_\_ N \_\_\_\_\_ E \_\_\_\_\_  
\_\_\_\_\_ Sec \_\_\_\_\_ T \_\_\_\_\_ S \_\_\_\_\_ R \_\_\_\_\_ W B&M

Plotted on aerial photo/field map \_\_\_\_\_ Scale \_\_\_\_\_

Subdivision \_\_\_\_\_ blk \_\_\_\_\_ lot \_\_\_\_\_; photos taken 2 35 m

SOURCE OF INFORMATION: owner, neighbor, driller, driller's log, personal observation,  
(circle) other (specify) \_\_\_\_\_

DRILLER AND COMPANY \_\_\_\_\_

DATE COMPLETED \_\_\_\_\_ TYPE OF DRILL RIG \_\_\_\_\_

HOLE DEPTH \_\_\_\_\_ ft, WELL DEPTH 128 <sup>rept</sup> ft, TOTAL CASING \_\_\_\_\_ ft, DIAM 6 in

WELL FINISH \_\_\_\_\_

PUMP: mfg. name & no. \_\_\_\_\_, depth set \_\_\_\_\_ ft, diam discharge pipe \_\_\_\_\_ in

WELL YIELD: \_\_\_\_\_ gpm for \_\_\_\_\_ hours with \_\_\_\_\_ ft drawdown, method of determining  
discharge \_\_\_\_\_; aquifer test date \_\_\_\_\_

WATER LEVEL: describe MP top of casing seal, which is 4 ft above below LSD

Hold-cut	WL below MP	WL below LSD	Time
1. <u>none</u>			
2. <u>can't get into casing</u>			
3. <u>modified pitless</u>			

Installed \_\_\_\_\_ recorder, W# \_\_\_\_\_, funding project \_\_\_\_\_

Remarks We have driller's log & related papers

USBIA1

PIT TOILET

RADIO  
ANTENNA  
POLE

GRAVEL  
PLAYGROUND - PARKING  
AREA

ROAD TO  
ILIAMNA

SCHOOL  
QTRS.

WATER WELL

STORAGE CACHES

SLIGHT PLANT

PIT TOILET

250 GAL  
DAY TANK

ROAD TO  
NEWHALEN

SCALE 1"=50'

NEWHALEN, ALASKA

US BIA 1



U.S. DEPT. OF THE INTERIOR  
GEOLOGICAL SURVEY  
WATER RESOURCES DIVISION  
GROUND WATER SITE INVENTORY  
SITE SCHEDULE

Recorded by FFJ-T

Date 11-21-72

Check One ☒ English ☐ Metric Units

#### GENERAL SITE DATA (0)

**Site Ident No** 8-574322

**RG Number** R-0\*

**Transaction** T- (A) D M Y \* Add, delete, modify, verified

**Site-Type** 2- C D H I M P T W \* collector, drain, ditch/dike, exhumator, multiple, pond, tunnel or well  
Reliability 3- C U L M \* Field checked, unchecked, location not, minimal accurate data

**Project No.** 5- \_\_\_\_\_ District 6- 021 \* State 7- 02 \* County (or town) New Haven \* 8- 030 \*

**Latitude** 9- 574322 \* Longitude 10- 11545332 \* Lat-Long Accuracy 11- S F Y M \* sec, S sec, Y sec, Min

**Local Number** 12- 574322 \* Land Not Loc. 13- 574322 \* 1/4 1/4 1/4 section, swamp, range, world

**Location Map** 14- D L T A N M A C - S \* Scale 15- 6322 \*

**Altitude** 16- 1103.1 \* Method of Measurement 17- A L M \* altimeter, level, map Accuracy 18- 25.1 \*

**Topo Setting** 19- D C E F H K L S P S T U V W \* depression, stream, dunot, flat, hilltop, slope, swamp, offshore, podmont, hillsides, terrace, undulating, valley, upland channel flat draw

**Date of First Construction/Completion** 21- 02/20/11, 967 \* Use of Site 23- A D E G H M P R S T U W X Z \* none, drain, gas, seismic, boat, observ., mine, oil or, exchange, reprint, test, unused, lith-, waste, destroyed thermal resort, alien, gas, drawal

**Use of Water** 24- A B C D E F H I M N P R S T U V Y Z \* air cond., bathing, commercial, domestic, power, fire, domestic, irrigation, medicinal, industrial, public, recreation, stock, institution, unused, dental, other supply

**Secondary Water Use** 25- \* Tertiary Use of Water 26- \* Depth of Hole 27- 128.6 \* Depth of Well 28- 128.6 \* Source of ① 29- D \* Depth Date 28- D \*

**Water Level** 30- 17.9 \* Date Measured 31- 02/20/11, 967 \* Source ① 33- D \* month day year

**Method of Measurement** 34- A C E G H L M R S T V Z \* altim., calibrated, estimated, pressure, calibrated, geophysical, manometer, reported, steel, electric, calibrated, other altim. gage pressure gage log tape tape electric tape

**Site Status** 37- D F G H S P R S T V X Z \* dry, flowing, nearby, nearby, obstruction, pumping, recently, nearby, nearby; foreign surface water other pumped pumping recently substance affects

**Source of Geohydrologic Data** 35- D \* Pump Used 35- \* Measuring Point 266- \_\_\_\_\_ \* Measuring Point Date 267- \_\_\_\_\_ \* month day year

**OWNER IDENTIFICATION (1)**

**OWNER IDENTIFICATION**

R = 158 \* T = A D M \* Date of Ownership 159 # 7/21/2011 \* 67 \*

add, delete, modify month day year

Name: Last 151 = V E R J A \* First 152 = H E N R Y H A L E T \* Middle Initial 153 = \*

## OTHER SITE IDENTIFICATION NUMBERS (1)

R=189 \*    T= A D M \*  
 add, delete, modify  
 New Card Same R & T

Ident 190# 00,1,    \*    Assigner 191- AK,MP,    \*  
 Ident 190# 89026    \*    Assigner 191- AKRG,    \*  
 190a BEDROCK+    191c CONFINED+

**SITE VISIT DATA (1)**

R=186 \*      T= A D M \*      Date of Visit 187#      Name of Person 188=

add, delete, modify      month    day    year      \*

## FIELD WATER QUALITY MEASUREMENTS (1)

R=192 \*    T= A D M \*    Date 193 # / / \*    Geohydro-logic Unit 195 # / / \*  
 add, delete, modify    month    day    year  
 New Card Same R thru 195  
 Temperature 196 # 0, 0, 0, 1, 0 \*    Degree C 197 = / / / / / \*  
 Conductance 198 # 0, 0, 8, 9, 5 \*    pH/mos 199 = / / / / / \*  
 Other (STORE) Parameter 196 # / / / / / \*    Value 197 = / / / / / \*  
 Other (STORE) Parameter 196 # / / / / / \*    Value 197 = / / / / / \*

**FOOT NOTES:**

① Source of Data Codes:

S	D	G	A	R	L	G	Z
---	---	---	---	---	---	---	---

reporting, driller, owner, other gov't. other      logs, geologist, other  
agency                                  reported.

WSBIA2

## WELL SCHEDULE

U. S. DEPT. OF THE INTERIOR

KP

GEOLOGICAL SURVEY

WATER RESOURCES DIVISION

## MASTER CARD

Record by AJF Source of data BIA Date 11-14-69 Map Illiamna (C-6)

State Alaska County 02 (or town) F.K

Latitude: 59 43 20 N Longitude: 15 45 30 W Sequential number: 1

Lat-long accuracy: 4 T 5 S 33 E Sec 21 SW SE SE SEWARD

Local well number: 5 C 0 0 5 0 3 3 2 1 D D C D Other number: well 4

Local use: 8 0 0 2 6 Owner or name: BIA Address: Newhalen, Alaska

Ownership: County, (F) Fed Gov't, (M) City, Corp or Co, Private, (S) State Agency, Water Dist F

Use of (A) Air cond, (B) Bottling, (C) Comm, (D) Devater, (E) Power, (F) Fire, (G) Dom, (H) Irr, (I) Med, (J) Ind, (K) Rec, (L) Stock, (M) Instit, (N) Unused, (O) Repressure, (P) Recharge, (Q) Desal-P S, (R) Desal-other, (S) Other P

Use of (A) Anode, (B) Drain, (C) Seismic, (D) Heat Res, (E) Obs, (F) Oil-gas, (G) Recharge, (H) Test, (I) Unused, (J) Withdraw, (K) Waste, (L) Destroyed U

DATA AVAILABLE: Well data 70 Freq. W/L meas.: 71 Field aquifer char. 72

Hyd. lab. data: 73

Qual. water data; type: Comp # 4992 74

Freq. sampling: 75 Pumpage inventory: yes 76 no, period: 77

Aperture cards: 78

Log data: 79

## WELL-DESCRIPTION CARD

SAME AS ON MASTER CARD Depth well: 128.7 ft Meas. 24 3

Depth cased: 4'10" Screen ft 12 4 Casing type: 11 ; Diam. 4 in 29 4

Finish: (C) porous concrete, (F) gravel w. horiz. screen, (G) gravel w. horiz. gallery, (H) open end, (I) perf., (J) screen, (K) sd. pt., (L) shored, (M) open hole, (N) other 5

Method: (A) air bored, (B) cable, (C) dug, (D) hyd jetted, (E) air reverse, (F) trenching, (G) driven, (H) drive wash, (I) other 2

Date Drilled: 2-21-67 9 6 7 Pump intake setting: 34 36

Driller: Roy L. Lumbert name address

Lift (A) air, (B) bucket, (C) cent, (D) jet, (E) multiple, (F) multiple, (G) nose, (H) piston, (I) rot, (J) submerg, (K) turb, (L) other 39 Deep 40

Power (type): diesel, elec, gas, gasoline, hand, gas, wind; H.P. 41 Trans. or meter no. 42

Descrip. MP 43 ft below LSD, Alt. MP 44

Alt. LSD: 45 Accuracy: (source) 47

Water Level 17'10" ft above MP; Ft below LSD 18 Accuracy: 48 D

Date meas: 1967 2 6 7 Yield: 60 gpm 49 60 Method determined 50

Drawdown: 105 ft 10 5 Accuracy: 3 Pumping period 51 hrs 52

QUALITY OF WATER DATA: Iron 53 Sulfate 54 Chloride 55 Hard. 56

Sp. Conduct 57 K x 10 58 Temp. 59 Date sampled 60

Taste, color, etc. 61

... 4-12

[illegible]

Foreman II well driller

USBIA2

Newhalen, Alaska Hole # 4 WO # 7026  
Feb. 20, 1967

Ground Level

6' Clay & Gravel

16'6" Clay, Gravel & Sand

20'4" Brown Clay

23'8" Brown Clay & Gravel

31'6" Gravel some clay

42'10"-6inch Casing

44'2" Blue clay & Gravel

51'6" Green Clay, Coarse Sand

57' Hard Pan & Gravel Water-1 Gal @ Min.

66'9" Hard Pan & Sand

86' Green Hard Pan & Sand

113'7" Green Slate

125'1" Blue Slate

128'7" Lime Stone (White)  
& Water in crack (no sand) 2-3 P

Total Depth 128'7"

One 5'8" .030 slot screen,  
4'10" screen exposed.

Static level 17'10",

Available drawdown 105'.

Will produce 60 gal @ min  
on full drawdown.

43'2" 6inch casing

127'10" 4 inch casing, 4inch  
casing is supported by 6inch  
casing. Would advise not  
to use a pitless adapter on  
this well.

Heat tape is hanging on  
bottom of well cap. But is  
probably not necessary, for  
this well should not freeze.  
200 ft. of heat tape in well

Drillers:

Galen Dirksen

Homer Pooler

Sketch by:

*Galen Dirksen*  
Foreman II Well Driller

US BIA 2

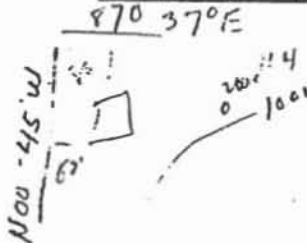
Latitude-longitude 59.43.20 154.53.30

## HYDROGEOLOGIC CARD

SAME AS ON MASTER CARD  
 Physiographic Province: \_\_\_\_\_  
 Drainage Basin: \_\_\_\_\_  
 Subbasin: 80B  
 Section: \_\_\_\_\_  
 Top of well site: (D) depression, stream channel, dunes, flat, hilltop, sink, swamp, (C) (K) (V) (K) (L)  
 (S) (T) (U) (V) offshore, pediment, hillside, terrace, undulating, valley flat  
 MAJOR AQUIFER: \_\_\_\_\_  
 system \_\_\_\_\_ series \_\_\_\_\_ aquifer, formation, group \_\_\_\_\_  
 Lithology: \_\_\_\_\_ Origin: \_\_\_\_\_ Thickness: \_\_\_\_\_ ft  
 Length of well open to: \_\_\_\_\_ ft Depth to top of: \_\_\_\_\_ ft  
 MINOR AQUIFER: \_\_\_\_\_  
 system \_\_\_\_\_ series \_\_\_\_\_ aquifer, formation, group \_\_\_\_\_  
 Lithology: \_\_\_\_\_ Origin: \_\_\_\_\_ Thickness: \_\_\_\_\_ ft  
 Length of well open to: \_\_\_\_\_ ft Depth to top of: \_\_\_\_\_ ft  
 Intervals Screened: 124 - 129  
 Depth to consolidated rock: \_\_\_\_\_ ft Source of data: \_\_\_\_\_  
 Depth to basement: \_\_\_\_\_ ft Source of data: \_\_\_\_\_  
 Surficial material: \_\_\_\_\_ Infiltration characteristics: \_\_\_\_\_  
 Coefficient Trans: \_\_\_\_\_ gpd/ft Coefficient Storage: \_\_\_\_\_  
 Perm: \_\_\_\_\_ gpd/ft<sup>2</sup> Spec cap: \_\_\_\_\_ gpa/ft; Number of geologic cards: \_\_\_\_\_

Log

0-6 - Gravel and Clay  
 6-16.2 - Clay gravel and sand  
 16.2-20.4 - Brown Clay  
 20.4-23.8 - Brown Clay and gravel  
 23.8-31.4 - Gravel and clay  
 31.4-44.2 - Blue clay and gravel  
 44.2-51.6 - Green clay - coarse gravel  
 51.6-57 - Hard pan and gravel  
 57-66.9 - " " and sand  
 66.9-86 - Green hard pan and sand  
 86-113.7 - Green slate  
 113.7-125.1 - Blue slate  
 125.1-128.7 - Limestone, white - water in cracks in rock



Well No.

AK-80026



11/12/44



US BIA 2

---

---

### **APPENDIX 3**

Well driller's logs for wells at the Iliamna FAA facility near Newhalen, Alaska

---

---

## WATER RESOURCES DIVISION

FOR THE

US FAA 1



C. A. A.

No. \_\_\_\_\_

OTHER NOS. \_\_\_\_\_

USFAA 1

# LIAMNA

SCHED M  
ILL-1

Drilled well log:

- 5-20' - silt & little gravel
- 20-34' - Glacial silt, 15" water in pipe
- 34-42' - Glacial silt - no water
- 42-~~43~~<sup>43</sup> - silt & shale rock
- ~~43~~<sup>43</sup>-46' - shale rock, broken up
- 47-49' - shale rock, broken up 25' water in pipe
- 50-53' - very hard shale, ~~no~~ no water in casing

1-2

7

Drilled below casing

- 54-58' - very hard shale rock. no water
- 59-60' - Broken up rock & some silt. Struck seam of <sup>3-10</sup> water. Water came up in casing to height of 12'6" from top of casing.

Drilling from Nov 10 - Dec 1, 1954

Housing area

INFO  
✓

6" cased well drilled on W side of pump house to a depth of 61'. casing 5' welded sections.

Casing down 53'. Solid Rock encountered at 49'

Drilling continued 8' below end of casing. Water vein encountered at 59'.

Pumped well with 1 HP jet for 5 hours with a flow of 600 GPM. Static water level 12'6" below

USFAA 2

11/14/44

Surface of ground. Got level 5' below it of  
ground. Water level 4' above pit while pumping at 600  
GPM.

Estimated 3 ft of gas and pumped 250 gal/hr  
with a 7' 10" draw-down.

Built 6x5' lean-to over well & cut standing water  
existing pump house. Lean-to has 6x6" ridge, skip well  
& roof. Both walls & roof covered with heavy roofing  
material. Inside of lean-to lined with fiber glass

## WELL SCHEDULE

U. S. DEPT. OF THE INTERIOR

K.P. GEOLOGICAL SURVEY

WATER RESOURCES DIVISION

## MASTER CARD

Record by AJK Source of data FHA Date 11-12-69 Map Illionna C-1  
State Alaska 02 County (or town) Illionna F.K.  
Latitude: 59 45 16 N Longitude: 154 54 25 Sequential number: 1  
Lat-long accuracy: 4 5 33 sec 9 1.14 SE SW SEWARD  
Local well number: 50005033090000 Other number: 16  
Local user: 80019 Owner of name: CAA - Driven well  
Owner or name: F.A.A. ILLIONNA Address: Illionna Alaska  
Ownership: County (C) Fed Gov't (F) City, Corp or Co, Private, State Agency, Water Dist (U) F  
Use of Air cond, Bottling, Comm, Dewater, Power, Fire, Dom, Irr, Med, Ind, (P S) Rec, (R)  
Water: (S) (T) (U) (V) (W) (X) (Y) (Z) C  
Stock, Inatit, Unused, Repressure, Recharge, Desal-P S, Desal-other, Other  
Use of (A) (D) (G) (H) (I) (J) (K) (L) (M) (N) (O) (P) (Q) (R) (S) (T) (U) (V) (W) (X) (Y) (Z)  
well: Anode, Drain, Seismic, Heat Res, Obs, Oil-gas, Recharge, Test, Unused, Withdraw, Waste, Destroyed, U  
DATA AVAILABLE: Well data 70 Freq. W/L meas.: 71 Field aquifer char. 72  
Hyd. lab. data: 73  
Qual. water data: type: 4879 74  
Freq. sampling: 75 Pumpage inventory: yes 76 no: period: 77  
Aperture cards: 78  
Log data: 79

## WELL-DESCRIPTION CARD

TD 21' 44"  
SAME AS ON MASTER CARD Depth well: 16 ft 21 Meas. 6  
Depth cased: 16 ft 16 Casing type: 2 in 2  
Finish: porous gravel w. (C) (F) (G) (H) (I) (J) (K) (L) (M) (N) (O) (P) (Q) (R) (S) (T) (U) (V) (W) (X) (Y) (Z) 7  
concrete, (perf.), (screen), gallery, end, other  
Method (A) (B) (C) (D) (E) (F) (G) (H) (I) (J) (K) (L) (M) (N) (O) (P) (Q) (R) (S) (T) (U) (V) (W) (X) (Y) (Z) 1  
Drilled: air bored, cable, dug, hyd jetted, air reverse trenching, (driven) drive wash, other  
rot, percussion, rotary, other  
Date 33 33 Pump intake setting: 34 34  
Driller: 35 35 address 36  
Lift (A) (B) (C) (D) (E) (F) (G) (H) (I) (J) (K) (L) (M) (N) (O) (P) (Q) (R) (S) (T) (U) (V) (W) (X) (Y) (Z) 37 Deep 38  
(type): air, bucket, cent, jet, multiple, multiple, nose, piston, rot, submerg, turb, other Shallow  
Power nat LP 39 Trans. or 40  
(type): diesel, elec, gas, gasoline, hand, gas, wind, H.P. meter no.  
Descrip. MP 41 above 42 Ft below LSD, Alt. MP 43  
Alt. LSD: 150 Accuracy: 44 (source) TOPO 150 45  
Water Level 46 83 ft above 47 8 Accuracy: 48  
Date 49 49 Yield: 1000 50 17 Method 51  
meas: 52 52 53 53 54 54 55 55 56 56 57 57  
Drawdown: 6 ft 58 1 Accuracy: 59 60 61 61 62 62 63 63  
QUALITY OF 64 64 65 65 66 66 67 67 68 68 69 69  
WATER DATA: Iron ppm Sulfate ppm Chloride ppm Hard. ppm  
Sp. Conduct 70 K x 10 71 Temp. 72 72 73 73 74 74 75 75  
Taste, color, etc. 76 76 77 77 78 78 79 79

FEDERAL AVIATION AGENCY

Chief, Plant Maintenance Branch, PM-5100

November 16, 1960

Arthur J. Iappi, Utilities Equipment Mechanic

Completion of Well Drilling Assignment - Ilwaco

Control Building:

1. Drilled six inch diameter cased well to a depth of 53 feet encountering solid rock. Continued drilling open hole through rock to a depth of 100 feet. Only water strata was from 18 feet to 23 feet.
2. Pulled casing back and installed 30 thousands opening Johnson Sverdur well screen between 18-21 feet.
3. Installed one-third H.P. Jacuzzi jet pump hooked up for shallow well one pipe operation. Pump Model #3-RPE-C- WLL-783, Motor Model C96N 2D6C1, H.P. 1/3, H.P.N. 3450, Volts 115, Amp. 5-6. New pressure tank and all new piping was installed from well to pump and from pump to pressure tank.
4. Built wood duct from well to underneath floor of control building. Installed 30 feet heating cable around drop pipe and pipe from pump to well.
5. Test pumped well 1000 gal per hour with 6 inch drawdown. Depth of well 21 feet 4 inches. Length of drop pipe 21 feet. Static level 8 feet 3 inches.

Garage Well: Drilled 6 inch cased well to a depth of 13 feet encountering solid rock and no water. Continued drilling through rock to a depth of 93 feet and no water. Pulled casing and dismantled drill.

Suggest that if water is required for power house and garage an underground pipe line could be run from quarters area to power house approximately two hundred feet and then to garage one hundred fifty feet.

Drill frame and motor made ready for air shipment to Anchorage for overhaul. Balance of drill equipment stored and made ready for shipment to Cold Bay. Drill log attached.

Returned to Anchorage via Pacific Northern Airlines October 18, 1960.

Arthur J. Iappi, PM-5100

Attachment

PM-5100

PM-5100, PM-5100, PM-5100

USFAA2

solid

USCAA2

CONTROL BUILDING WELL	
DEPTH	DESCRIPTION
1-9	Clay and Gravel mixed
10	Gravel - little water
18-22	Gravel and sand - water hydrostatic pressure
22-35	Gray sand - no water
36-43	Clay and some Gravel - no water
44-53	Clay layers and Gravel - no water
54-100'	Solid rock - Green basic rock
GAGE-GR WELL	
DEPTH	DESCRIPTION
1-7	Clay and Gravel mixed - no water
8-35	Clay and little Gravel - no water
36-56	Hard pan - no water
57-60	Hard pan mixed with Gravel - no water
60-93'	Solid rock - Green basic rock



---

---

## **APPENDIX 4**

Water quality analysis reports for wells in Newhalen, Alaska and at the Iliamna FAA facility

---

---

## ANALYTICAL NOTES

Location Iliamna, Alaska County             
 Source Drilled Depth (ft) 61 Diam (in.) 5  
 Cased to (ft) 53 Date drilled 11/54 Point of coll. Qts. #2  
 Owner CAA Iliamna, Alaska  
 Treatment            Use Dom.  
 WBF            WL 12 ft Yield 250/H<sub>2</sub>O?  
 Temp (° F)            Appear. w.c. Clear  
 Collected 7/18/58 By W. S. Holmes.  
 Remarks           

	ppm	epm		ppm	epm
SiO <sub>2</sub> <u>10 ml</u> <u>31</u>			HCO <sub>3</sub> <u>37.80</u> <u>57 ml</u> <u>6.0</u>		
<u>Abs. O.D. Sample 440</u>			<u>0.60</u>	<u>30</u>	<u>.98</u>
<u>O.D. W ppm 420</u>			<u>5.00</u>		
<u>Dil: 1+1</u>					
Al <u>          </u> ml <u>          </u>			CO <sub>3</sub> <u>          </u> ml <u>          </u>		
Abs. (Al+Fe) <u>          </u>					
Abs. (Fe) <u>          </u>					
Fe <u>          </u> <u>25 ml</u> <u>0.05</u>			OH <u>          </u> ml <u>          </u>		
<u>Abs. O.D. Sample 320</u>					
<u>MI std 0.5 Sample 415</u>					
Fe <u>          </u> ml <u>          </u>			SO <sub>4</sub> <u>0.60</u> <u>25 ml</u> <u>8.0</u>		
Abs. <u>          </u>			<u>0.15</u>	<u>40 ppm</u>	<u>.17</u>
MI std <u>          </u>			<u>0.15</u>	<u>.095</u>	
Mn <u>          </u> ml <u>0.01</u>			<u>0.10</u>		
Abs. <u>          </u>			<u>0.35</u>		
MI std <u>          </u>					
<u>          </u> ml <u>          </u>			Cl <u>1.65</u> <u>50 ml</u> <u>3.5</u>		
			<u>1.20</u>		<u>.10</u>
			<u>0.45</u>		
			<u>.10</u>		
			<u>0.35</u>		
<u>          </u> ml <u>          </u>			F <u>          </u> <u>10 ml</u> <u>0.0</u>		
			MI std <u>          </u>		<u>.00</u>
Ca <u>0.40</u> <u>6.30</u> <u>50 ml</u> <u>13</u>		<u>.65</u>			
<u>4.00</u> <u>4.60</u>					
<u>1.50</u> <u>1.70</u>					
<u>3.9</u>					
Mg <u>0.75</u> <u>8.75</u> <u>50 ml</u> <u>3.8</u>		<u>.32</u>			
<u>6.30</u> <u>6.30</u>					
<u>2.00</u> <u>2.45</u>					
<u>          </u> ml <u>          </u>			NO <sub>3</sub> <u>          </u> <u>25 ml</u> <u>0.0</u>		
			<u>Abs. O.D. Sample 010</u>		<u>.00</u>
			<u>MI std O.D. ppm 300</u>		
<u>          </u> ml <u>          </u>					

Lab. No. Col- 4880

			ppm	epr				ppm	epr
Na			8.0	35					
10 ppm	Reading	Avg							
Sample	82.0	100							
Standard	34.0								
	3.0								
K			0.1	1.00					
	Reading	Avg							
std	100								
Sample	3.0								
std									
Total cations			1.32		Total anions			1.25	

Total ions, epm 2.57      Difference, epm .07      Percent difference + 2.7%

		ppm			
			Specific Conductance (micromhos at 25° C) R KCl <u>331</u> R Sample <u>334</u>		110
			pH		5.9
			Color		5
Dissolved Solids	Sum	58 ✓			
	Residue on evap. at 180° C _____ ml				
Hardness as CaCO <sub>3</sub>	_____ ml			By	Date
			Analyzed	E. E. C.	8/15/58
	.97 .98	.96 -.98	Calc. checked	E. E. C.	8-18-58
			Reviewed	J. B. P.	5/25/58
	Noncarbonate		Reviewed	CAC	8/28/58
			Typed	J. B. P.	8/27/58
			Typing checked		

USFAA1

ILIAMNA  
SW

9-260  
(January 1953)

UNITED STATES DEPARTMENT OF THE INTERIOR, GEOLOGICAL SURVEY  
WATER RESOURCES DIVISION

Dep C

ANALYTICAL STATEMENT

[Parts per million]

Location <u>Iliamna, Alaska</u>	Date of collection <u>4-1-57</u>	Use _____	SiO <sub>2</sub> <u>21</u>
Source <u>Drilled well</u>	Temperature (°F) _____	Fe <u>0.00</u>	Ca <u>15</u>
Depth: <u>61'</u>	Color <u>5</u> pH <u>7.0</u>	Mg <u>1.7</u>	Na <u>6.4</u>
CAA station _____	Suspended matter _____	K <u>0.1</u>	CO <sub>2</sub> <u>0</u>
	Hardness as CaCO <sub>3</sub> _____	HCO <sub>3</sub> <u>68</u>	SO <sub>4</sub> <u>3.0</u>
	N. C. <u>0</u> Total <u>44</u>	Cl <u>1.5</u>	F <u>0.1</u>
	Ignition loss _____	NO <sub>3</sub> <u>0.0</u>	Mn <u>0.00</u>
	Dissolved solids _____	Sum <u>82</u>	
	Specific conductance at 25°C _____		
	(micromhos) <u>117</u>		
Chemist <u>ESB, REC</u>			
Lab. No. <u>4050</u>			
Collector _____			

16-55348-4

3

USFAA1

Lab. No. 4050

rCa	.748	1.169
rMg	.140	1.223
rNa	.278	.054
rK	.003	2.392 = - 2.3% error
	1.169	

rCO <sub>2</sub>	.000
rHCO <sub>3</sub>	1.114
rSO <sub>4</sub>	.062
rCl	.042
rF	.005
rNO <sub>3</sub>	.000
	1.223

Date completed ESB 4-23-57

Checked by REC 4-24-57

Project \_\_\_\_\_

Transmitted \_\_\_\_\_

Remarks \_\_\_\_\_

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY  
WATER RESOURCES DIVISION

WELL SCHEDULE

Date MARCH-13-62, 19\_\_\_\_ Field No. TL-3  
Record by M Office No. \_\_\_\_\_  
Source of data CHSM ANAL

1. Location: State ALASKA County SW  
Map \_\_\_\_\_  
\_\_\_\_\_ $\frac{1}{4}$ \_\_\_\_\_ $\frac{1}{4}$  sec. \_\_\_\_\_ T \_\_\_\_\_ N \_\_\_\_\_ R \_\_\_\_\_ E \_\_\_\_\_  
S \_\_\_\_\_ W \_\_\_\_\_  
2. Owner: CAA Address LIAMNA  
Tenant \_\_\_\_\_ Address \_\_\_\_\_  
Driller \_\_\_\_\_ Address \_\_\_\_\_  
3. Topography \_\_\_\_\_  
4. Elevation \_\_\_\_\_ ft. above \_\_\_\_\_ below \_\_\_\_\_  
5. Type: Dug, drilled, driven, bored, jetted 11 19 54  
6. Depth: Rept. 61 ft. Meas. \_\_\_\_\_ ft.  
7. Casing: Diam. 5 in., to \_\_\_\_\_ in., Type \_\_\_\_\_  
Depth 53 ft., Finish \_\_\_\_\_  
8. Chief Aquifer \_\_\_\_\_ From \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Others \_\_\_\_\_  
9. Water level 12 ft. rept. \_\_\_\_\_ 19\_\_\_\_ above \_\_\_\_\_ below \_\_\_\_\_  
\_\_\_\_\_ which is \_\_\_\_\_ ft. above \_\_\_\_\_ below surface  
10. Pump: Type \_\_\_\_\_ Capacity \_\_\_\_\_ G. M.  
Power: Kind \_\_\_\_\_ Horsepower \_\_\_\_\_  
11. Yield: Flow \_\_\_\_\_ G. M., Pump \_\_\_\_\_ G. M., Meas., Rept. Est. \_\_\_\_\_  
Drawdown \_\_\_\_\_ ft. after \_\_\_\_\_ hours pumping \_\_\_\_\_ G. M.  
12. Use: Dom., Stock, PS., RR., Ind., Irr., Obs. \_\_\_\_\_  
Adequacy, permanence \_\_\_\_\_  
13. Quality \_\_\_\_\_ Temp \_\_\_\_\_ °F.  
Taste, odor, color \_\_\_\_\_ Sample Yes \_\_\_\_\_ No \_\_\_\_\_  
Unfit for \_\_\_\_\_  
14. Remarks: (Log, Analyses, etc.) 7-18-58- # 4880

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY  
WATER RESOURCES DIVISION

WELL SCHEDULE

Date March 19, 1959, 19\_\_\_\_ Field No. TL-1  
Record by P.R. Lord Office No. \_\_\_\_\_  
Source of data Copied from Lapne's file-RW

1. Location: State Alaska County SW  
Map \_\_\_\_\_  
\_\_\_\_\_ $\frac{1}{4}$ \_\_\_\_\_ $\frac{1}{4}$  sec. \_\_\_\_\_ T \_\_\_\_\_ N \_\_\_\_\_ R \_\_\_\_\_ E \_\_\_\_\_  
S \_\_\_\_\_ W \_\_\_\_\_  
2. Owner: Civil Aeronautics Authority LIAMNA  
Address \_\_\_\_\_  
Tenant W side of pump house Address \_\_\_\_\_  
Driller \_\_\_\_\_ Address \_\_\_\_\_  
3. Topography \_\_\_\_\_  
4. Elevation \_\_\_\_\_ ft. above \_\_\_\_\_ below \_\_\_\_\_  
5. Type: Dug, drilled, driven, bored, jetted 12-119 54  
6. Depth: Rept. 60 ft. Meas. \_\_\_\_\_ ft.  
7. Casing: Diam. 6 in., to \_\_\_\_\_ in., Type \_\_\_\_\_  
Depth 53 ft., Finish \_\_\_\_\_  
8. Chief Aquifer \_\_\_\_\_ From \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Others \_\_\_\_\_  
9. Water level 12 1/2 ft. rept. \_\_\_\_\_ 19\_\_\_\_ above \_\_\_\_\_ below \_\_\_\_\_  
\_\_\_\_\_ which is \_\_\_\_\_ ft. above \_\_\_\_\_ below surface  
10. Pump: Type \_\_\_\_\_ Capacity \_\_\_\_\_ G. M.  
Power: Kind \_\_\_\_\_ Horsepower \_\_\_\_\_  
11. Yield: Flow \_\_\_\_\_ G. M., Pump \_\_\_\_\_ G. M., Meas., Rept. Est. \_\_\_\_\_  
Drawdown \_\_\_\_\_ ft. after \_\_\_\_\_ hours pumping \_\_\_\_\_ G. M.  
12. Use: Dom., Stock, PS., RR., Ind., Irr., Obs. \_\_\_\_\_  
Adequacy, permanence \_\_\_\_\_  
13. Quality \_\_\_\_\_ Temp \_\_\_\_\_ °F.  
Taste, odor, color \_\_\_\_\_ Sample Yes \_\_\_\_\_ No \_\_\_\_\_  
Unfit for \_\_\_\_\_  
14. Remarks: (Log, Analyses, etc.) Over # 4050

1155AA1



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY  
WATER RESOURCES DIVISION

14-2

WELL SCHEDULE

Date MARCH 13-62, 19 62 Field No.           
Record by JA Office No.           
Source of data CHEM ANAL

1. Location: State ALASKA County SW  
Map         

1/4 1/4 sec. T N R E  
S W

2. Owner: CHA Address DIANA  
Tenant          Address           
Driller          Address         

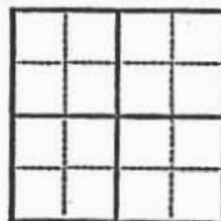
3. Topography         

4. Elevation          ft. above  
below

5. Type: Drill, drilled, driven, bored, jetted 19

6. Depth: Rept. 18 ft. Meas.          ft.

7. Casing: Diam. 2 in., to          in., Type           
Depth 18 ft., Finish         



8. Chief Aquifer          From          ft. to          ft.  
Others         

9. Water level 14 ft. rept.          19          above  
meas. below  
which is          ft. above  
below surface

10. Pump: Type          Capacity          G. M.  
Power: Kind          Horsepower         

11. Yield: Flow          G. M., Pump          G. M., Meas., Rept. Est.           
Drawdown          ft. after          hours pumping          G. M.

12. Use: Dom., Stock, PS., RR., Ind., Irr., Obs.           
Adequacy, permanence         

13. Quality          Temp          °F.  
Taste, odor, color          Sample Yes           
Unfit for          No         

14. Remarks: (Log, Analyses, etc.) 7/18/58 #4879

USFAA2

## ANALYTICAL NOTES

Location Iliamna Station, Alaska County 18 ft  
 Source Drove ? Depth (ft) 18 ft Diam (in.) 2 in  
 Cased to (ft) 18 Date drilled Point of coll. station  
 Owner CAA Iliamna  
 Treatment Use  
 WBF WL 14 ft Yield 150  
 Temp (° F) Appear. w.c. Clear  
 Collected 7/18/58 By W.S. Holmes  
 Remarks

	ppm	epm		ppm	epm
SiO <sub>2</sub> <u>10 ml</u> <u>1.5</u> Abs. O.D. Smp. 620 O.D. 10 ppm 420			HCO <sub>3</sub> <u>50 ml</u> <u>28</u> <u>36.00</u> <u>5.20</u> <u>1.40</u>		<u>14</u> <u>.46</u>
Al <u>ml</u> Abs. (Al+Fe) <u></u> Abs. (Fe) <u></u>			CO <sub>3</sub> <u>ml</u>		
Fe, <u>55 ml</u> <u>0.05</u> Abs. <u>1 ppm .30</u> MI std O.D. Smp. .015			OH <u>ml</u>		
Fe, <u>ml</u> Abs. <u></u> MI std <u></u>			SO <sub>4</sub> <u>50 ml</u> <u>0.0</u> <u>0.40</u> <u>0.30</u> <u>0.30</u> <u>0.30</u> <u>0.10</u> <u>0.05</u> <u>0.05</u> <u>0.05</u> <u>0.05</u> <u>0.05</u>		<u>.00</u>
Mn, <u>ml</u> <u>0.01</u> Abs. <u></u> MI std <u></u>			Cl <u>50 ml</u> <u>5.0</u> <u>1.20</u> <u>0.60</u> <u>0.60</u> <u>1.0</u> <u>0.50</u>		<u>.14</u>
<u>ml</u>			F <u>10 ml</u> <u>0.0</u> MI std <u>4.00</u>		<u>.00</u>
Ca <u>50 ml</u> <u>6.4</u> <u>4.60</u> <u>3.80</u> <u>0.80</u>		<u>.32</u>	<u>ml</u>		
Mg <u>50 ml</u> <u>2.1</u> <u>6.35</u> <u>5.10</u> <u>1.25</u>		<u>.17</u>	<u>ml</u>		
<u>ml</u>			NO <sub>3</sub> <u>55 ml</u> <u>0.2</u> Abs. O.D. Smp. .065 MI std O.D. 1 ppm .300		<u>.00</u>
<u>ml</u>			<u>ml</u>		

Lab. No. Col- 4879Field No. R No. 

USFAA2

Lab. No. Col- 4879

		ppm	epm			ppm	epm
Na	Reading 100 Avg 12 ppm Sample 34.0 2.5 ppm 34.0 2.0	2.6 2.5	.11		ml		
K	Reading 100 Avg Sample 4.0 std	0.2	.00		ml		
					ml		
					ml		
Total cations			.60	Total anions			.60
Total ions, epm			1.20	Difference, epm			.00
				Percent difference			0.0
		ppm					
			Specific Conductance (micromhos at 25° C) R KC1 331 R Sample 5330		62		
			pH		5.5		
			Color		0		
Dissolved Solids	Sum	45					
	Residue on evap. at 180° C ml						
Hardness as CaCO <sub>3</sub>				By	Date		
	ml		Analyzed	530	8/15/58		
	.49 .46 .03	24	Calc. checked	3AB	8-18-58		
	Noncarbonate	2	Reviewed	7/17/58	8/16/58		
			Reviewed	10AC	8/28/58		
			Typed	3/2/58	8/27/58		
			Typing checked				

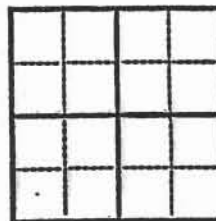
USFAA-2

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY  
WATER RESOURCES DIVISION

WELL SCHEDULE

*Skainna 7*  
Date \_\_\_\_\_, 19\_\_\_\_ Field No. *70*  
Record by *William* Office No. \_\_\_\_\_  
Source of data *OT Hudson, Skainna Alaska*

1. Location: State \_\_\_\_\_ County \_\_\_\_\_  
Map \_\_\_\_\_  
\_\_\_\_\_  $\frac{1}{4}$  \_\_\_\_\_  $\frac{1}{4}$  sec. \_\_\_\_\_ T \_\_\_\_\_ N \_\_\_\_\_ S \_\_\_\_\_ R \_\_\_\_\_ E \_\_\_\_\_ W \_\_\_\_\_
2. Owner: *FAA - at airport* Address \_\_\_\_\_  
Tenant \_\_\_\_\_ Address \_\_\_\_\_  
Driller \_\_\_\_\_ Address \_\_\_\_\_
3. Topography \_\_\_\_\_
4. Elevation \_\_\_\_\_ ft. above \_\_\_\_\_ below \_\_\_\_\_
5. Type: Dug, drilled, driven, bored, jetted \_\_\_\_\_ 19\_\_\_\_
6. Depth: Rept. *70 ?* ft. Meas. \_\_\_\_\_ ft.
7. Casing: Diam. \_\_\_\_\_ in., to \_\_\_\_\_ in., Type \_\_\_\_\_  
Depth \_\_\_\_\_ ft., Finish \_\_\_\_\_
8. Chief Aquifer \_\_\_\_\_ ? From \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Others \_\_\_\_\_
9. Water level \_\_\_\_\_ ft. rept. \_\_\_\_\_ 19\_\_\_\_ above \_\_\_\_\_ below \_\_\_\_\_  
\_\_\_\_\_ which is \_\_\_\_\_ ft. above \_\_\_\_\_ below surface
10. Pump: Type \_\_\_\_\_ Capacity \_\_\_\_\_ G. M. \_\_\_\_\_  
Power: Kind \_\_\_\_\_ Horsepower \_\_\_\_\_
11. Yield: Flow \_\_\_\_\_ G. M., Pump \_\_\_\_\_ G. M., Meas., Rept. Est. \_\_\_\_\_  
Drawdown \_\_\_\_\_ ft. after \_\_\_\_\_ hours pumping \_\_\_\_\_ G. M.
12. Use: Dom., Stock, PS., RR., Ind., Irr., Obs. \_\_\_\_\_  
Adequacy, permanence \_\_\_\_\_
13. Quality \_\_\_\_\_ Temp \_\_\_\_\_ °F.  
Taste, odor, color \_\_\_\_\_ Sample Yes \_\_\_\_\_ No \_\_\_\_\_  
Unfit for \_\_\_\_\_



Remarks: (Log, Analyses, etc.) *Worked on in 1961*

9-361  
(Oct. 1965)

**PARTIAL ANALYSIS NOTES**

Lab. No. 4050  
Drilled Well, Iliamna, Alaska  
Depth: 61'  
CAA Station

11-57

Specific conductance (Micromhos at 25° C)		117
R KCl	R Sample	298
Ca	50 ml.	1.70 ✓ 5.75 ✓ 1.4
Mg	50 ml.	1.7 ✓ 6.4 ✓
Na+K (calo.)		0.12 ✓
CO <sub>2</sub>	50 ml.	11.40 ✓ 5.60 ✓ 5.40 ✓
SO <sub>4</sub>	25 ml.	5.75 ✓ 5.50 ✓ 1.25 ✓ 0.15 ✓
Cl	50 ml.	1.95 ✓ 1.70 ✓ 2.0 ✓ 1.10 ✓ 4.65 ✓
F	10 ml.	3.95 ✓
NO <sub>3</sub>	50 ml.	0.00 ✓ 0.00 ✓ 0.00 ✓
Sum		5
O.D. Sample		125
Hardness: N.C.		0
Total		44
Color		5
pH		7.0
Lab. No.	4050	

USFAAI

4050  
5 ml  
10 ml. Std.  
O.D. Std. 1340  
O.D. Sample 360

25 ml  
10 ml. Std.  
O.D. Std. 1181  
O.D. Sample 1000

20 ml  
2.3 ✓  
44

TONS PER ACRE-FOOT

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY  
WATER RESOURCES DIVISION

WELL SCHEDULE

Date June 6, 1962 Field No. \_\_\_\_\_

Record by M Office No. \_\_\_\_\_

Source of data Chc. Anal.

1. Location: State Alaska County S.W.

Map \_\_\_\_\_

1/4 sec. \_\_\_\_\_ T. 2N R. 10E S. 1

2. Owner: BIA Address NEW HALEN

Tenant \_\_\_\_\_ Address \_\_\_\_\_

Driller \_\_\_\_\_ Address \_\_\_\_\_

3. Topography \_\_\_\_\_

4. Elevation \_\_\_\_\_ ft. above \_\_\_\_\_ below

5. Type: Dug, drilled, driven, bored, jetted \_\_\_\_\_ 10 \_\_\_\_\_

6. Depth: Rept. \_\_\_\_\_ ft. Meas. \_\_\_\_\_ ft.

7. Casing: Diam. \_\_\_\_\_ in., to \_\_\_\_\_ in., Type \_\_\_\_\_

Depth \_\_\_\_\_ ft., Finish \_\_\_\_\_

8. Chief Aquifer \_\_\_\_\_ From \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Others \_\_\_\_\_

9. Water level \_\_\_\_\_ ft. rept. \_\_\_\_\_ 10 \_\_\_\_\_ above \_\_\_\_\_ below

\_\_\_\_\_ which is \_\_\_\_\_ ft. above \_\_\_\_\_ below surface

10. Pump: Type \_\_\_\_\_ Capacity \_\_\_\_\_ G. M. \_\_\_\_\_

Power: Kind \_\_\_\_\_ Horsepower \_\_\_\_\_

11. Yield: Flow \_\_\_\_\_ G. M., Pump \_\_\_\_\_ G. M., Meas., Rept. Est. \_\_\_\_\_

Drawdown \_\_\_\_\_ ft. after \_\_\_\_\_ hours pumping \_\_\_\_\_ G. M.

12. Use: Dom., Stock, PS., RR., Ind., Irr., Obs. \_\_\_\_\_

Adequacy, permanence \_\_\_\_\_

13. Quality \_\_\_\_\_ Temp \_\_\_\_\_ °F.

Taste, odor, color \_\_\_\_\_ Sample Yes \_\_\_\_\_ No \_\_\_\_\_

Unfit for \_\_\_\_\_

14. Remarks: (Log, Analyses, etc.) H 7022 - MAY 762



GROUND WATER			LAB. NO. 7022		
County : <u>BUREAU OF INDIAN AFFAIRS</u>		pc.No. :		WELL DATA	
Sample No. :		Region :		Type :	Drilled :
Inv. :				Depth : <u>      </u> Ft.	Dia. : <u>      </u> In.
W.O.No. :				Cased : <u>      </u> Ft.	Perf. : <u>      </u>
GW Basin :				Gravel packed :	
Loc. : <u>NEWHALEN, ALASKA</u>				Use :	
				Owner :	
				Remarks :	
Samp. Pt. :					
Pumptime :					
Temp. : <u>      </u> °F.					
Agency :					
Remarks :					
SILICA <u>10</u> ml		IRON (dis) <u>25</u> ml		IRON (total) <u>      </u> ml	
A <u>44.0</u> mg <u>0.10</u>		A <u>11.6</u> mg <u>0.01</u>		A <u>      </u> mg	
Factor <u>0.2272</u>		Factor <u>0.034</u>		Factor <u>      </u>	
Asample <u>46.0</u>		Asample <u>2.0</u>		Asample <u>      </u>	
SiO <sub>2</sub> ppm <u>10</u>		Fe ppm <u>0.07</u>		Fe ppm <u>      </u>	
SODIUM <u>      </u> dil		POTASSIUM <u>      </u> dil			
Sample <u>88.0</u> %T		Sample <u>3.5</u> %T			
Curve <u>&lt;10 PPM</u>		X <u>0.128</u>			
Na ppm <u>8.6</u>		K ppm <u>0.4</u>			
SULFATE <u>10</u> ml		CHLORIDE <u>50</u> ml		FLUORIDE <u>10</u> ml	
<u>0.15-B=0.10</u>		1 ml = 0.5mg Cl <u>0.70-B=0.60ml</u>		abs Coeff. ml = <u>6.5</u> X <u>0.025</u> mg Std <u>0.01</u>	
SO <sub>4</sub> ppm <u>2.0</u>		Cl ppm <u>6.0</u>		F ppm <u>0.2</u>	
SUM <u>6.3</u>		HARDNESS <u>50</u> ml		pH <u>6.7</u>	
T/A ft <u>      </u>		as CaCO <sub>3</sub> <u>1.60ml</u>		e.gm <u>0.48</u> Ca	
DISSOLVED SOLIDS <u>      </u> ml		SPECIFIC CONDUCTANCE		e.gm <u>0.16</u> Mg	
		R (KCl) <u>341</u>		<u>0.79</u> HCO <sub>3</sub>	
		R sample <u>3430</u>		<u>0.04</u> SO <sub>4</sub>	
		Total <u>32</u>		<u>0.37</u> Na	
		HCO <sub>3</sub> (0-82) <u>39</u>		<u>0.01</u> K	
		Micromhos at 25°C <u>99</u>		<u>0.00</u> NO <sub>3</sub>	
D.S. ppm <u>      </u>		Non-Carb <u>      </u>		Sum <u>1.02</u>	
				Sum <u>1.01</u>	
				Δ <u>+0.01</u>	
				Σ <u>2.03</u>	

22

<b>ALUMINUM</b> _____ ml A _____ mg _____ Appar. Al _____ Asample _____ Factor _____ Fe X .12 _____ Mn X .04 _____ F X .05+ _____ Al ppm <input type="text"/>	<b>COPPER</b> _____ ml A _____ mg _____ Asample _____ Acolor _____ Acorr. _____ Factor _____ Cu ppm <input type="text"/>
<b>MANGANESE (qual.)</b> _____ ml A _____ mg _____ Asample _____ Factor _____ Mn ppm <input type="text"/>	<b>LEAD</b> _____ ml A _____ mg _____ Asample _____ Factor _____ Pb ppm <input type="text"/>
<b>CHROMIUM</b> _____ ml A _____ mg _____ Asample _____ Factor _____ Cr ppm <input type="text"/>	<b>ZINC</b> _____ ml A _____ mg _____ Asample _____ Factor _____ Zn ppm <input type="text"/>
<b>ARSENIC</b> _____ ml A _____ mg _____ Asample _____ Factor _____ As ppm <input type="text"/>	<b>_____</b> _____ ml A _____ mg _____ Asample _____ Factor _____ ppm <input type="text"/>

State

9-016  
(Rev. 9-61)



Lat. 

0	1	11	NS
5		10	11

Long. 

0	1	11
12		18

Seq.

Well

Owner

Spec.

# **WATER SAMPLE** U.S. Geological Survey

9992

Well No. 4

Date of Collection 2/21/67

Location NEWHALEN  
(City, st, near or direction from)

(County) ALASKA  
(State)

1/4 sec. T N R E  
S W

Source DRILLED  
(Type of well)

Owner B.I.A. PDIC  
P.O. Box 1938 ANCHORAGE  
(Address of owner)

Date drilled 2/21/67 Depth 128 ft

Water-bearing formation LIMESTONE

Reducing intervals from (Over) to

Sodium % Na 

0	0	0
40-20	54	58
68		

 1.17

Potassium 

0	59	61
	0	0

 0.00

1.37 1.32

epm  
cations

epm  
anions

% of Error 1.9

Sampling Depth 

26	29
----	----

Type 

30
----

Collected by R.F. Long batham

Appearance Clear

WBF

HCO<sub>3</sub>

62 65  
24

CO<sub>3</sub>

66 67  
18

SO<sub>4</sub>

0.45 or 0.50  
-0.20  
0.25 68 72  
5.0

Cl

0.75  
0.55

73 78  
3.9

Data Source<sup>d</sup> 79

Card Q Q

F

55-48  
0.01 26 28  
0.01

NO<sub>3</sub>

0.01

0.015

29 32  
0.4

PO<sub>4</sub>

33 35

Total Alkalinity

6.2 0.90 as HCO<sub>3</sub> 60  
3.15 as CaCO<sub>3</sub> 49  
4.8 = 3.00 as CO<sub>3</sub> 30

B

36

Al

39

Iron

Total

12 (d) 1

0.040

Mn

46

Cu

50

Pb

53

Zn

55

Dissolved Solids

58 Residue

0.50 0.45

64 Calc

Hardness

70

Total

1

0.50 HCO<sub>3</sub> (0.82)

74

Non-Carb

Color

78 79

Card R

5

USPBA2



Water level (pumping, static) 35 ft.

above, below

Sampled after pumping (time) 60 HR

Yield 60 G.M. Flow Pump PUMP  
(Meas. or est.)

Point of collection DISCHARGE

Appearance CLEAR  
(Clear, colored, turbid, sediment, etc.)

Temperature 36 Degrees F.

Circle Use

☒ Dom., Public Supply, Stock, Irr., Ind., RR,  
Air Cond., Bottling, Condensing

Collected by ROY F. LONGBOYMAN

Remarks

LEAVE A LITTLE AIR SPACE IN BOTTLE

USBI42

State  County 

 Lat.          

 Long.          

 Seq. No.  Date Coll.     

 Sampling Depth     Type 

 Well Location Norwich Peak #4

 Collected by R.F. Long batham

 Owner BTA

 Appearance Clear

WBF

## Specific Conductance

 R (KCl) 346  
 R Sample 2780

 31     35

 PH     Temp °F    

 Silica      

0.690

 Calcium      

 45     49

 Magnesium      

 50     53

 Sodium % Na 85  
 40-20     54     58

 Potassium      

 0     59     61

1.37

 epm  
cations

 HCO<sub>3</sub>

0.39

 CO<sub>3</sub>

0.60

 SO<sub>4</sub>

0.10

Cl

0.11

 Data Source      

F

0.01

 NO<sub>3</sub>

0.01

 PO<sub>4</sub>

1.32

 epm  
anions

 % of Error 1.9

## Total Alkalinity

 8.2 0.40 as HCO<sub>3</sub> 60  
~~4.8 = 3.00~~ as CaCO<sub>3</sub> 49  
 as CO<sub>3</sub> 30

B

Al

Iron

Total

0.040

Cu

Pb

Zn

Dissolved Solids

58 Residue

Hardness

Total

 0.50 HCO<sub>3</sub> (0.82)

Non-Carb

Color

78 79

Card R

11531A2



State	County	Lat.	Long.	Seq. No.	Date	Samp. depth	c
-------	--------	------	-------	----------	------	-------------	---

Remarks:

Br \_\_\_\_\_ ml 26 28

I \_\_\_\_\_ ml 29 31

Alk. as CaCO<sub>3</sub> 32 35

Free CO<sub>2</sub> 36 38

SAR 39 41

RSC 42 44

Organics  
MBAS (ABS) \_\_\_\_\_ ml 45 47

48 50

51 54

# Radiochemical

Alpha (pc/l) 55

Beta (pc/l) 58

Ra (pc/l) 61

U (ug/l) 64

Other data (67-79)<sup>e</sup> 67 70

Total CO<sub>2</sub> 0.1  
60 x 0.002

a Master card A (21-34)

b Master card A (52-66)

c Type:

- |                   |                      |
|-------------------|----------------------|
| 1. Pumped         | 4. Spigot            |
| 2. Bucket         | 5. Bailer            |
| 3. Forest         | 6. Special           |
| d Source of data: | Federal              |
| 1. USGS           | 5. <del>XXXXXX</del> |
| 2. UPHS           | 6. Private           |
| 3. State Health   | 7. Educational       |

9. U.S. Army

<sup>e</sup> Indicate constituent and card columns.

Chemist 4 Checked by \_\_\_\_\_

Date began 3/21/67 Date transmitted \_\_\_\_\_

Punched by \_\_\_\_\_ Verified \_\_\_\_\_

USRIAD

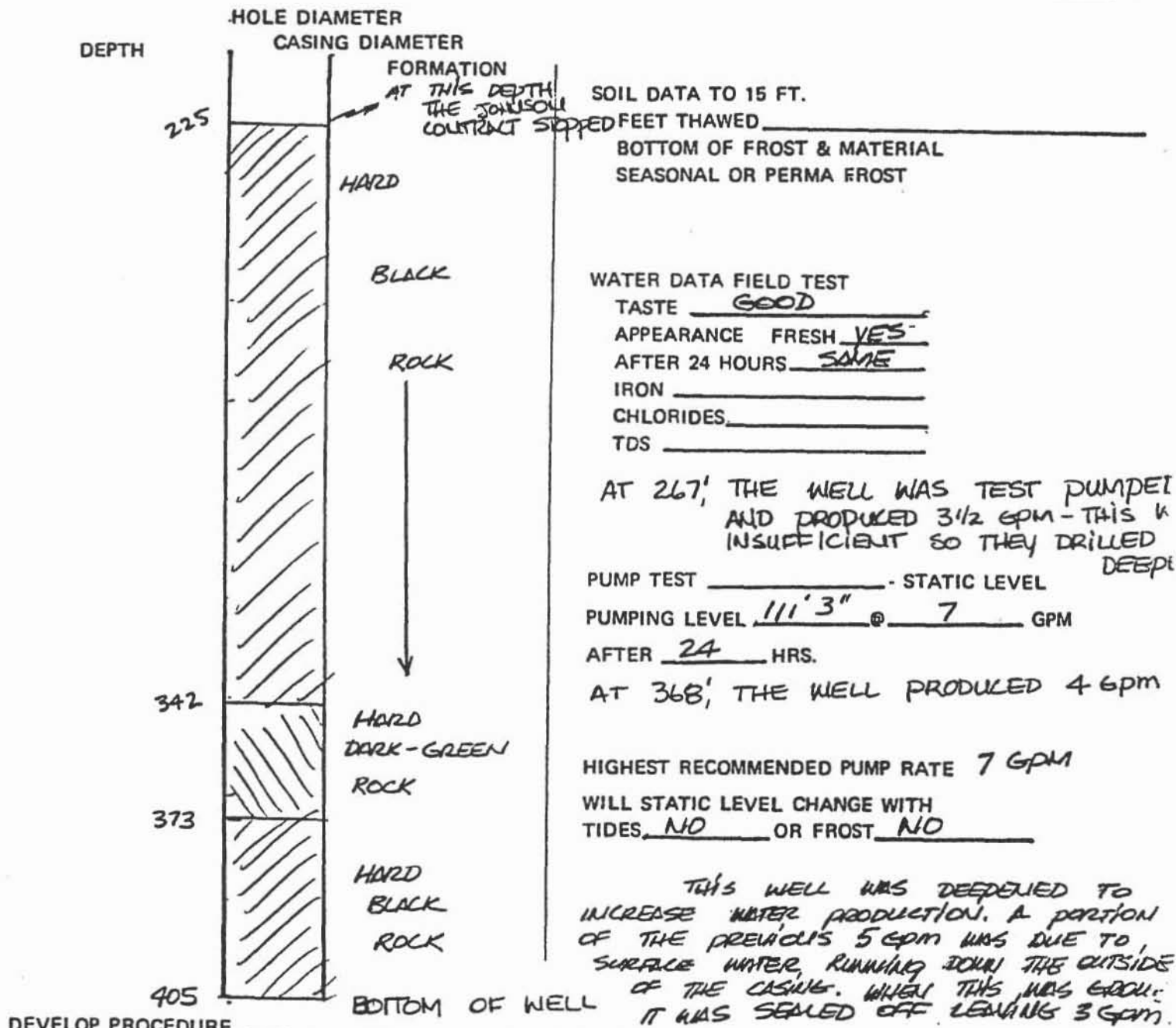


## WELL LOG

THIS WELL WAS STARTED  
BY JOHNSON & CO. AND DRILL  
TO A DEPTH OF 225'.  
THE DRILLERS STARTED AT  
THIS DEPTH.

U.S. PUBLIC HEALTH SERVICE, DIVISION OF INDIAN HEALTH

LOCATION NEWHALEN, ALASKA DATE STARTED 8/13/84  
DATE COMPLETED 8/27/84 DRILLER BOB HOPP / JOHN MILLER  
TOTAL DEPTH OF WELL 405' FT. CASING INSTALLED OPEN HOLE DIAMETER 6"  
GROUT 15' TOC SCREEN SIZE N/A MFG. N/A LENGTH N/A  
STATIC WATER LEVEL 14 FT. HRS. PUMPED 24 @ 7 GPM DRAWDOWN 97' FT.



ESTIMATED MAN HOURS FOR DRILLING \_\_\_\_\_ HOURS FOR TOTAL JOB \_\_\_\_\_

CREW ROBT HOPP / PINK MILLER USPHS

Completed 10/82

New Haven Test Well  
By Johnson Drilling Co.  
King Salmon

COLUMN WRITE

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40

6" Casing

brake

17' Casing

Static level 15' (overnight)

Drive Shoe

Consolidated  
Volcanic Material  
17' - 200'

Open Borehole  
17' - 200'

recovers at approx  
0.6 gpm from 200'

(4 hrs to reach static  
of 100')

200'

USPHS



# CHEMICAL & GEOLOGICAL LABORATORIES OF ALASKA, INC.

TELEPHONE (907)-279-4014  
274-3364

ANCHORAGE INDUSTRIAL CENTER  
5633 B Street



## Drinking Water Analysis Report for Inorganic, Organic, and Radiochemical Contaminants

### TO BE COMPLETED BY PUBLIC WATER SUPPLIER

#### PUBLIC WATER SYSTEM:

--	--	--	--	--	--

I.D. NO.

Alaska Area Native Health Service

Public Water System Name

701 C. Street, Box 65

Address

Anchorage

Alaska

99513

City

State

Zip Code

Note: Check box to left of contaminants listed below for the analyses desired.

#### SAMPLE DESCRIPTION:

Collected By James Appleton

Explanatory Well

Sample Location

Source Type ☐ Surface Water

☒ Ground Water

Sample Date

1	1
---	---

Mo.

0	4
---	---

Day

8	2
---	---

Year

☒ Routine Sample

☐ Untreated Water

☐ Special Purpose Sample

☐ Treated Water

### TO BE COMPLETED BY CERTIFIED LABORATORY

#### CHEMICAL & GEOLOGICAL LABORATORIES OF ALASKA, INC.

Laboratory Name

5633 "B" STREET

Address

ANCHORAGE,

ALASKA

99502

City

State

Zip Code

Sample No.

Station No.

929

Laboratory Analysis No.

DB

Received by

November 5, 1982

Date

#### INORGANICS

	Limit	Mg/l
<input type="checkbox"/> Arsenic	(0.05)<	0 . 0 1
<input type="checkbox"/> Barium	(1.)<	0 . 5
<input type="checkbox"/> Cadmium	(0.010)<	0 . 0 1 0
<input type="checkbox"/> Chromium	(0.05)<	0 . 0 5
<input type="checkbox"/> Fluoride	(2.4)<	0 . 1 0
<input type="checkbox"/> Iron	(0.3)	0 . 4 0 ✓
<input type="checkbox"/> Lead	(0.05)<	0 . 0 5
<input type="checkbox"/> Manganese	(0.05)<	0 . 0 5
<input type="checkbox"/> Mercury	(0.002)<	0 . 0 0 1
<input type="checkbox"/> Nitrate - Nitrogen	(10.)	0 . 3 0
<input type="checkbox"/> Selenium	(0.01)<	0 . 0 1
<input type="checkbox"/> Silver	(0.05)<	0 . 0 5
<input type="checkbox"/> Sodium	(250)	1 . 4
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		

ND Indicates Not Detected

November 11, 1982

Date Analysis Completed

#### ORGANICS

	Limit	Mg/l
<input type="checkbox"/> Endrin	(0.0002)	
<input type="checkbox"/> Lindane	(0.004)	
<input type="checkbox"/> Methoxychlor	(0.1)	
<input type="checkbox"/> Toxaphene	(0.005)	
<input type="checkbox"/> 2, 4-D	(0.1)	
<input type="checkbox"/> 2,4,5 - TP Silvex	(0.01)	
<input type="checkbox"/>		
<input type="checkbox"/>		

#### RADIOACTIVITY

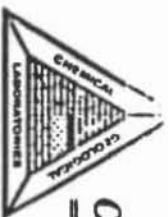
	Limit	pCi/l
<input type="checkbox"/> Gross Alpha	(15)	
<input type="checkbox"/> Radium 226 & 228	(5)	
<input type="checkbox"/> Gross Beta	(50)	
<input type="checkbox"/> Strontium - 90	(8)	
<input type="checkbox"/> Tritium	(20,000)	
<input type="checkbox"/>		
<input type="checkbox"/>		

Signature of Laboratory Supervisor

WSPHS

11-11-82

Date reported



# CHEMICAL & GEOLOGICAL LABORATORIES OF ALASKA, INC.

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



## ANALYTICAL REPORT

CUSTOMER Alaska Area Native Health Service SAMPLE LOCATION: Newhalen, Alaska

DATE COLLECTED 11-4-82 TIME COLLECTED: \_\_\_\_\_

SAMPLED BY James Appleton SOURCE Explanatory Well

REMARKS Slightly high Iron content. Extremely soft water  
with low buffering capacity and low ph will be  
excessively corrosive if used untreated.

mg/l

mg/l

mg/l

[ ] Ag, Silver	<0.05	[ ] P, Phosphorous	<0.05	[ ] Cyanide	
[ ] Al, Aluminum	0.40	[ ] Pb, Lead	<0.05	[ ] Sulfate	1.5
[ ] As, Arsenic	<0.01	[ ] Pt, Platinum	<0.05	[ ] Phenol	
[ ] Au, Gold	<0.05	[ ] Sb, Antimony	<0.10	[ ] Total Dissolved Solids	16
[ ] B, Boron	<0.05	[ ] Se, Selenium	<0.01	[ ] Total Volatile Solids	
[ ] Ba, Barium	<0.5	[ ] Si, Silicon	4.2	[ ] Suspended Solids	
[ ] Bi, Bismuth	<0.05	[ ] Sn, Tin	<0.10	[ ] Volatile Suspended Solids	
[ ] Ca, Calcium	2.1	[ ] Sr, Strontium	<0.05	[ ] Hardness as CaCO <sub>3</sub>	7
[ ] Cd, Cadmium	<0.01	[ ] Ti, Titanium	<0.05	[ ] Alkalinity as CaCO <sub>3</sub>	9
[ ] Co, Cobalt	<0.05	[ ] W, Tungsten	<1	[ ] HCO <sub>3</sub>	11
[ ] Cr, Chromium	<0.05	[ ] V, Vanadium	<0.05		
[ ] Cu, Copper	<0.05	[ ] Zn, Zinc	<0.05		
[ ] Fe, Iron	0.40	[ ] Zr, Zirconium	<0.05		
[ ] Hg, Mercury	<0.001	[ ] Ammonia Nitrogen-N		* * * *	*
[ ] K, Potassium	1	[ ] Kjeldahl Nitrogen-N		[ ] mmhos Conductivity	20
[ ] Mg, Magnesium	0.34	[ ] Nitrate-N	0.30	[ ] pH Units	5.4
[ ] Mn, Manganese	<0.005	[ ] Nitrite-N		[ ] Turbidity NTU	
[ ] Mo, Molybdenum	<0.05	[ ] Phosphorus (Ortho)-P		[ ] Color Units	
[ ] Na, Sodium	1	[ ] Chloride	<1	[ ] T. Coliform/100ml	
[ ] Ni, Nickel	<0.05	[ ] Fluoride	<0.1	[ ]	

FOR LAB USE ONLY  
REC'D. BY DB LAB # 929

DATE RECEIVED November 5, 1982

DATE COMPLETED November 11, 1982

DATE REPORTED November 11, 1982

SIGNED Opt. phen O. Pde

USP45



# CHEMICAL & GEOLOGICAL LABORATORIES OF ALASKA, INC.

TELEPHONE (907) 562-2343

ANCHORAGE INDUSTRIAL CENTER  
5633 B Street



## Drinking Water Analysis Report for Inorganic, Organic, and Radiochemical Contaminants

### TO BE COMPLETED BY PUBLIC WATER SUPPLIER

#### PUBLIC WATER SYSTEM:

--	--	--	--	--	--

I.D. NO.

Alaska Area Native Health Service

Public Water System Name

701 C Street, Box 65

Address

Anchorage, Alaska

99513

City

State

Zip Code

Note: Check box to left of contaminants listed below for the analyses desired.

#### SAMPLE DESCRIPTION:

Collected By B. Hopp

Hendricks 400' Well Newhalon, Alaska

Sample Location

Source Type ☐ Surface Water ☒ Ground Water

Sample Date

0 8

Mo.

0 8

Day

8 4

Year

☐ Routine Sample

☐ Special Purpose Sample

☒ Untreated Water

☐ Treated Water

### TO BE COMPLETED BY CERTIFIED LABORATORY

#### CHEMICAL & GEOLOGICAL LABORATORIES OF ALASKA, INC.

Laboratory Name

5633 "B" STREET

Address

ANCHORAGE,

ALASKA

99502

City

State

Zip Code

Sample No.

Station No.

6168

Laboratory Analysis No.

GY

8/8/84

Received by

Date

#### INORGANICS

	Limit	Mg/l
<input type="checkbox"/> Arsenic	(0.05)	0 . 0 0 5
<input type="checkbox"/> Barium	(1.)	0 . 0 5
<input type="checkbox"/> Cadmium	(0.010)	0 . 0 0 2
<input type="checkbox"/> Chromium	(0.05)	0 . 0 1
<input type="checkbox"/> Fluoride	(2.4)	0 . 2 4
<input type="checkbox"/> Lead	(0.05)	0 . 0 1
<input type="checkbox"/> Mercury	(0.002)	0 . 0 0 0 2
<input type="checkbox"/> Nitrate - Nitrogen	(10.)	0 . 1 0
<input type="checkbox"/> Selenium	(0.01)	0 . 0 0 1
<input type="checkbox"/> Silver	(0.05)	0 . 0 1
<input type="checkbox"/> Turbidity	(1 NTU)	1 3
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		

ND Indicates Not Detected

August 14, 1984

Date Analysis Completed

#### ORGANICS

	Limit	Mg/l
<input type="checkbox"/> Endrin	(0.0002)	
<input type="checkbox"/> Lindane	(0.004)	
<input type="checkbox"/> Methoxychlor	(0.1)	
<input type="checkbox"/> Toxaphene	(0.005)	
<input type="checkbox"/> 2, 4-D	(0.1)	
<input type="checkbox"/> 2,4,5 - TP Silvex	(0.01)	
<input type="checkbox"/>		
<input type="checkbox"/>		

#### RADIOACTIVITY

	Limit	pCi/l
<input type="checkbox"/> Gross Alpha	(15)	
<input type="checkbox"/> Radium 226 & 228	(5)	
<input type="checkbox"/> Gross Beta	(50)	
<input type="checkbox"/> Strontium - 90	(8)	
<input type="checkbox"/> Tritium	(20,000)	
<input type="checkbox"/>		
<input type="checkbox"/>		

*Stephen C. Ede*  
Signature of Laboratory Supervisor

USPHS

August 14, 1984

Date reported





# CHEMICAL & GEOLOGICAL LABORATORIES OF ALASKA, INC.

TELEPHONE (907) 562-2343

ANCHORAGE INDUSTRIAL CENTER  
5633 B Street



## ANALYTICAL REPORT

CUSTOMER Alaska Area Native Health Service SAMPLE LOCATION: New Halen, Alaska

DATE COLLECTED 7-21-84 TIME COLLECTED:       

SAMPLED BY B. Hopp SOURCE Hendricks Well

REMARKS Soft and potentially corrosive water with high Iron and high pH.

FOR LAB USE ONLY  
RECVD. BY GY LAB # 6168

DATE RECEIVED August 8, 1984

DATE COMPLETED August 14, 1984

DATE REPORTED August 14, 1984

SIGNED Stephen C. Ede

	mg/l		mg/l		mg/l
<input type="checkbox"/> Ag, Silver	<0.05	<input type="checkbox"/> P, Phosphorous	<0.05	<input type="checkbox"/> Cyanide	
<input type="checkbox"/> Al, Aluminum	0.43	<input type="checkbox"/> Pb, Lead	<0.05	<input type="checkbox"/> Sulfate	4.2
<input type="checkbox"/> As, Arsenic	<0.05	<input type="checkbox"/> Pt, Platinum	<0.05	<input type="checkbox"/> Phenol	
<input type="checkbox"/> Au, Gold	<0.05	<input type="checkbox"/> Sb, Antimony	<0.05	<input type="checkbox"/> Total Dissolved Solids	55
<input type="checkbox"/> B, Boron	<0.05	<input type="checkbox"/> Se, Selenium	<0.05	<input type="checkbox"/> Total Volatile Solids	
<input type="checkbox"/> Ba, Barium	<0.05	<input type="checkbox"/> Si, Silicon	7.1	<input type="checkbox"/> Suspended Solids	
<input type="checkbox"/> Bi, Bismuth	<0.05	<input type="checkbox"/> Sn, Tin	<0.05	<input type="checkbox"/> Volatile Suspended Solids	11
<input type="checkbox"/> Ca, Calcium	3.8	<input type="checkbox"/> Sr, Strontium	<0.05	<input type="checkbox"/> Hardness as CaCO <sub>3</sub>	
<input type="checkbox"/> Cd, Cadmium	<0.01	<input type="checkbox"/> Ti, Titanium	<0.05	<input type="checkbox"/> Alkalinity as CaCO <sub>3</sub>	35
<input type="checkbox"/> Co, Cobalt	<0.05	<input type="checkbox"/> W, Tungsten	<1.0	<input type="checkbox"/>	
<input type="checkbox"/> Cr, Chromium	<0.05	<input type="checkbox"/> V, Vanadium	<0.05	<input type="checkbox"/>	
<input type="checkbox"/> Cu, Copper	<0.05	<input type="checkbox"/> Zn, Zinc	0.12	<input type="checkbox"/>	
<input type="checkbox"/> Fe, Iron	1.1	<input type="checkbox"/> Zr, Zirconium	<0.05	<input type="checkbox"/>	
<input type="checkbox"/> Hg, Mercury	<0.05	<input type="checkbox"/> Ammonia Nitrogen-N		<input type="checkbox"/>	
<input type="checkbox"/> K, Potassium	<1	<input type="checkbox"/> Kjeldahl Nitrogen-N		<input type="checkbox"/> umhos Conductivity	95
<input type="checkbox"/> Mg, Magnesium	0.40	<input type="checkbox"/> Nitrate-N		<input type="checkbox"/> pH Units	8.4
<input type="checkbox"/> Mn, Manganese	<0.05	<input type="checkbox"/> Nitrite-N		<input type="checkbox"/> Turbidity NTU	
<input type="checkbox"/> Mo, Molybdenum	<0.05	<input type="checkbox"/> Phosphorus (Ortho)-P		<input type="checkbox"/> Color Units	
<input type="checkbox"/> Na, Sodium	15	<input type="checkbox"/> Chloride	4.0	<input type="checkbox"/> .Coliform/100ml	
<input type="checkbox"/> Ni, Nickel	<0.05	<input type="checkbox"/> Fluoride		<input type="checkbox"/>	

ASPHS