WATER

HYDROLOGICAL DATA

GROUND WATER RECONNAISSANCE AND

DRILLED WELLS STUDIES

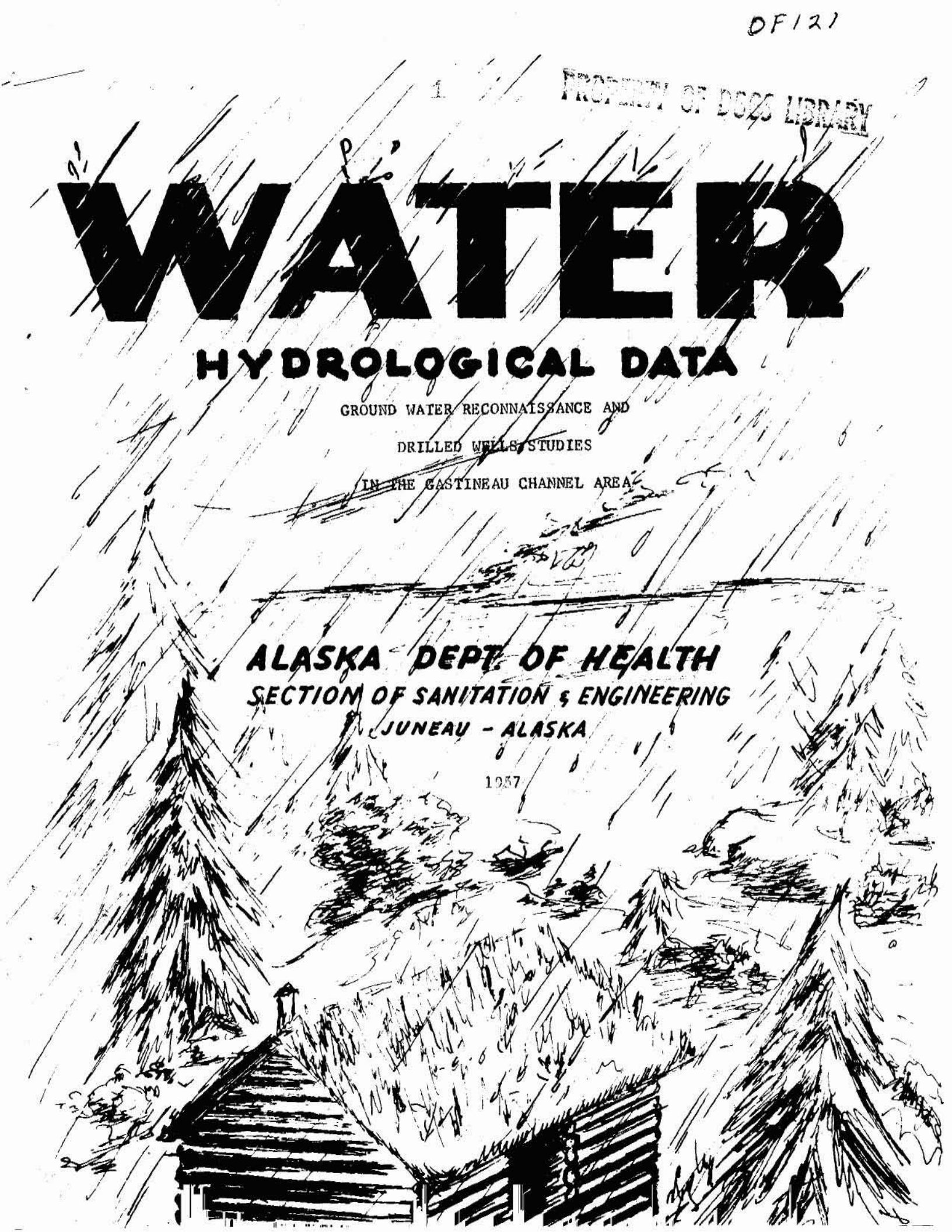
IN THE GASTINEAU CHANNEL AREA

ALASKA DEPT. OF HEALTH

SECTION OF SANITATION & ENGINEERING

JUNEAU - ALASKA

1957



SECTION OF SANITATION AND ENGINEERING
ALASKA DEPARTMENT OF HEALTH
Juneau, Alaska

DRILLED WELLS
Juneau Area

Practical data on ground water sources in the Juneau area have been compiled from reports and logs of well drilling operations of the Alaska Drilling Corporation.

At Point Lena, drilling was done in volcanic rocks which include lavas, flow breccias, tuffs, and conglomerates. These rocks are among the hardest and firmest of the area. Clay slates are interstratified with the tuffaceous beds in some places. One well (Number 7) out of the seven wells studied in this area yielded water in slate. The others yielded water in volcanic material. The volcanic rock water producers, which include six wells in this area, yielded water at depths of 44 to 85 feet. The average yield from these six wells was approximately 120 g.p.h. The slate producer yielded only 12 g.p.h. at 195 feet. Well Number 43, at 85 feet produced the greatest yield (480 g.p.h.) from volcanic rock.

In the Auke Bay Area, Quaternary sand, gravel, and silt deposits are thicker and overlie, generally, fissile black clay slates. Fourteen producing wells in this area range in depths from 71 to 145 feet in this formation. The yield varies from 20 to 1200 g.p.h. depending upon the degree of fractured rock encountered. The well drilled at the Chapel by the Lake produces 1200 g.p.h. from fractured slate resulting from stresses developed during faulting. The depth of this well is 120 feet. The average depth of drilling in this area for the better producers, averaging approximately 230 g.p.h., apparently occurs at about 85 feet.

The next area to be considered is that along Fritz Cove Road where four wells were drilled in black slate with water yields of 96 - 300 g.p.h. The best producer was one drilled 70 feet and yielded 300 g.p.h. However, the average depth of drilling was about 72 feet and the average yield from these wells, 170 g.p.h. It appears, therefore, that the rock in this area is less fractured than similar slate strata in the Auke Bay area.

One drilled well, located on the East margin of the outwash plain at Lemon Creek, is producing water at the rate of 37 g.p.h. from a depth of 165 feet in shale. Further west in this outwash plain proper, the water supply from shallower wells should be much better as glacial and stream deposits of silts, sands and gravels are quite thick.

Nearer Juneau and at Mile 1 to 2, drilled wells in Quaternary deposits of sand and gravel obtained water at 23 to 67 feet. The best yield was at 39 feet at a rate of 700 g.p.h. The poorest yield was obtained at 67 feet, at a rate of 60 g.p.h.

Along North Douglas Road, drilling into slate at depths of 75 to 230 feet yielded some water depending, of course, on the degree of fractured rock encountered. One well drilled into black slate to a depth of 230 feet

yielded no water. Another well produced water at the rate of 37 g.p.h. at a depth of 118 to 131 feet in slate. The best yield so far in slate has occurred at 75 feet. This well (Number 21) produces about 90 g.p.h. Where volcanic rock was encountered (wells 14 & 15) at depths of 40 to 47 feet, better yields of water were obtained at rates of 180 to 240 g.p.h.

In most areas, therefore, it seems probable that enough water for individual home supplies can be obtained from hard rock formations. The yield will depend upon the porosity which is dependent on the degree of fractured rock encountered. The highest yield from rock formation has occurred from the Chapel by the Lake well and, in this case, a high degree of fracturing due to faulting was encountered at 120 feet. This is, of course, an exception and unless such fractured zones are present, the yield will be low.

The best areas for producing larger supplies of water appear to be the outwash plains of the major streams along Glacier Highway. The unconsolidated material in these areas, consisting of silt, sand, and gravel, should allow effective percolation of precipitation and stream flow into porous deposits.

Samples of water tested for chemical analysis so far indicate the ground water in the Juneau area is of good character. The only objectionable feature noted is the somewhat high sodium content. The chloride content is very low considering the proximity to the ocean. Hardness runs about 80-120 ppm and the water, therefore, is classified moderately hard.

The attached map shows locations of wells which have been reported. A log of these wells is also attached indicating location, depth, water level, g.p.h. and depth cased. The attached report by Mr. Roger M. Waller of the Geological Survey describes his ground water reconnissance studies in the Juneau Area.

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Environmental Sanitation Advisor

JUNEAU AREA
DRILLED WELLS

	Name	Location	Depth Feet	Water Level Feet	G.P.H.	Depth Cased Feet
1.	Juneau Childrens' Home	Glacier Highway	---	---	---	---
2.	Donald Vertin	Auke Bay	90	12	240	14
3.	Perry Hobbs	Point Lena	44	F	25	9
4.	Robert Druxman	Auke Bay	83	13	20	29
5.	Spencer Israelson	N. Douglas Rd.	32	---	---	---
6.	Ken Buzzell	Stevens Point	75	26	30	13
7.	Minfield Home	Point Lena	195	19	12	25
8.	Jim DeHart	Auke Bay	90	F	360	51
9.	Jack Thompson	Auke Bay	71	F	60	31
10.	Ralph Smith	Fritz Cove Rd.	53	F	110	36
11.	Axel Neilson	Auke Bay	130	50	150	41
12.	Jack Donohue	Tee Harbor	100	---	---	---
13.	Ben Nowacki	Auke Bay	80	F	30	63
14.	Bill Ahrenfeld	N. Douglas Rd.	40	1	240	20
15.	Ernest Kolhase	N. Douglas Rd.	47	F	180	24
16.	Stanley Jekill	Auke Bay	85	19	300	34
17.	W. Deboff	Pt. Stevens Rd.	78	8	27	21
18.	Marvin Petit	Auke Bay	90	23	100	30
19.	Floyd Ogden	Auke Bay	80	21	60	33
20.	Robert Parker	Fritz Cove Rd.	80	4	96	30
21.	Spencer Israelson #2	N. Douglas Rd.	75	F	90	28
22.	Leo Thompson	Glacier Highway	165	F	37	76
23.	George Danner	Glacier Highway	23	6	600	22
24.	Lee Coon	Fritz Cove Rd.	78	10	135	14


Mendenhall Lake
T O N G A S S
N A T I O N A L
F O R E S T
Point Lena
Auke Village Recreation Area
Indian Point
Point Louisa
Strauss Rock
Symonds Point
AUKE BAY
Auke Bay
Auke Lake
MENDENHALL RIVER
Duck Creek
Jordan
GLACIER HIGHWAY
JUNEAU AIRPORT
Mendenhall Peninsula
Coghlan Island
Smugglers Cove
Spuhn Island
Spuhn I
Spuhn Pt.
Entrance Pt
Hut Pt
FRITZ COVE
Fritz Cove
S T E P H E N S
Portland Island
Light
Cabin
DOUGLAS ISLAND
Outer Point
Vanderbilt Hill
JUNEAU TOWNSITE BOUNDARY
Salmon Creek
Juneau Mtn
JUNEAU

UNITED STATES
DEPARTMENT OF THE INTERIOR
Geological Survey
Washington 25, D.C.

RECONNAISSANCE OF GROUND-WATER POSSIBILITIES IN THE JUNEAU AREA, ALASKA

By Roger M. Waller

June 1955

Open-file memorandum. Not reviewed for conformance with editorial standards of the Geological Survey

A brief reconnaissance of the Juneau area, Alaska, was made to investigate the ground-water conditions. Particular reference was made to the availability of small water supplies to meet the standards of the Alaska Department of Health.

A reconnaissance was made along Glacier Highway from Juneau to Tee Harbor, along Fritz Cove Road on Mendenhall Peninsula, and along the channel side of Douglas Island north of the bridge. The topography and geology were observed and an effort was made to estimate the subsurface conditions and ground-water potential of the area.

The bench that lies between the mountains and the ocean throughout most of this area is mantled by alluvium and slope wash material from the mountains. This material is relatively thin at the seaward edge of the bench, but probably thickens toward the mountains. In some places, however, bedrock is exposed. Precipitation soaks into the alluvium and slope wash readily, gradually percolates downward to the water table, and then moves toward the sea. Most wells drilled into this material would be relatively shallow.

There also appears to be a thin cover of water-laid deposits (Material deposited in standing water) on some of the benches. It probably consists of materials reworked from the alluvium and possibly from the underlying beds. Well-sorted silt, sand, and gravel were observed. In some places, where former streams had cut deep channels in the underlying formation or formed deltas in water, these deposits are quite thick (as, for example, in a gravel pit near Salmon Creek, where they are about 25 feet thick). The water-laid deposits are usually found about 40 feet above sea level and are characterized by numerous fossil shells. Like the alluvium, they should be water bearing, but, unless they are thick enough to permit wells to be cased deep enough to exclude contamination, there is a risk of obtaining water of poor sanitary quality.

Glacial till commonly underlies the surficial deposits of alluvium, slope wash, and water-laid material described above. The till (locally called "blue clay" in most instances) is characterized by its tough digging, its blue-gray color, and its composition of nonsorted clay, sand, and stones of all sizes. It is exposed in many road cuts, where it flows or slides when wet. Water percolating downward from the overlying material does not penetrate the till readily; consequently, it acts as a "floor" for the nearsurface layer of water. The thickness of the

till varies greatly from one locality to another. There may be interbedded layers of sand and gravel which, if sufficiently extensive, might contain an adequate supply of water.

Underneath the glacial till there may be outwash sands and gravels, or alluvium laid down before the till was deposited. If such underlying deposits were encountered they probably would be water bearing. They might extend toward the mountains, where surface water could percolate into them, either through cracks in the bedrock or directly where the till has been eroded away.

The underlying bedrock is mainly greenstone or greenstone schist on the Juneau side of the channel and black slate on the Douglas Island side; it is fairly well fractured in the exposed outcrops. Openings along the bedding planes, which dip about 30° to 60° to the northeast, and fractures should allow water to circulate through the bedrock. Wells drilled into this rock may encounter water in various amounts, depending upon the number of openings intersected.

The outwash plains of the major creeks, such as Lemon Creek, consist of sorted sands and gravels deposited by them. Wells drilled in these plains should penetrate these sand and gravel beds at fairly shallow depths. The plains are poorly drained, however, and few homes are being built upon them. Near the edges of the plains, or upstream, the land should be better drained and offer good well-location sites.

The possibility of developing dependable ground-water supplies in the Juneau area depends on the distribution and thickness of the formations described above. In general, it appears that along Glacier Highway and on Douglas Island wells would have to be drilled through the till to tap any underlying sands, or the fractured bedrock. However, wells drilled at many localities on Douglas Island may encounter water in the alluvium and the water-laid deposits which overlie the till or black slate, and which appear to be thicker here than on the Juneau side of the channel. The black slate appears to be highly fractured and has platy bedding or cleavage which should allow water to circulate freely.

Along Fritz Cove Road the bedrock does not appear to have as many fractures as elsewhere. Near the base of the slopes the wells may encounter water in the cover material and/or bedrock at shallow depth. Wells that are drilled on the more gently sloping bench along the east side of the road probably would have to extend into the bedrock. If the alluvial cover is thick (it thickens toward the higher ground), it may contain enough water for domestic supplies.

Generally speaking, the bedrock contains fewer fractures at depth than it does near the surface. Low spots in the topography and the gentler slopes should have first preference for drilling. A driller should be able to tell, during drilling, if the rock seems to be getting tighter - that is, is less fractured. If so, it would be advisable to stop drilling and try at another location where more water-bearing fractures may be encountered.

Although the character of some of these formations seems favorable for the occurrence of small to modest ground-water supplies, it should be emphasized that the character of the formations probably differs con-

siderably from place to place. Because of this, it is impossible to predict with assurance the presence of useful ground-water supplies at individual localities, and dependence will have to be placed upon drilling.

A test hole was drilled recently with a diamond-core drill, northeast of Juneau, to determine if ground-water was available at that location. The hole was started in a 12-foot pit dug in glacial till. The drilling progressed in till to a depth of 75 feet. Eight feet of medium fine (?) sand was then encountered, overlying the bedrock. The well was drilled 4 feet into bedrock, making a total depth of 87 feet. It was reported that the test hole flowed 1 gallon of water per minute.