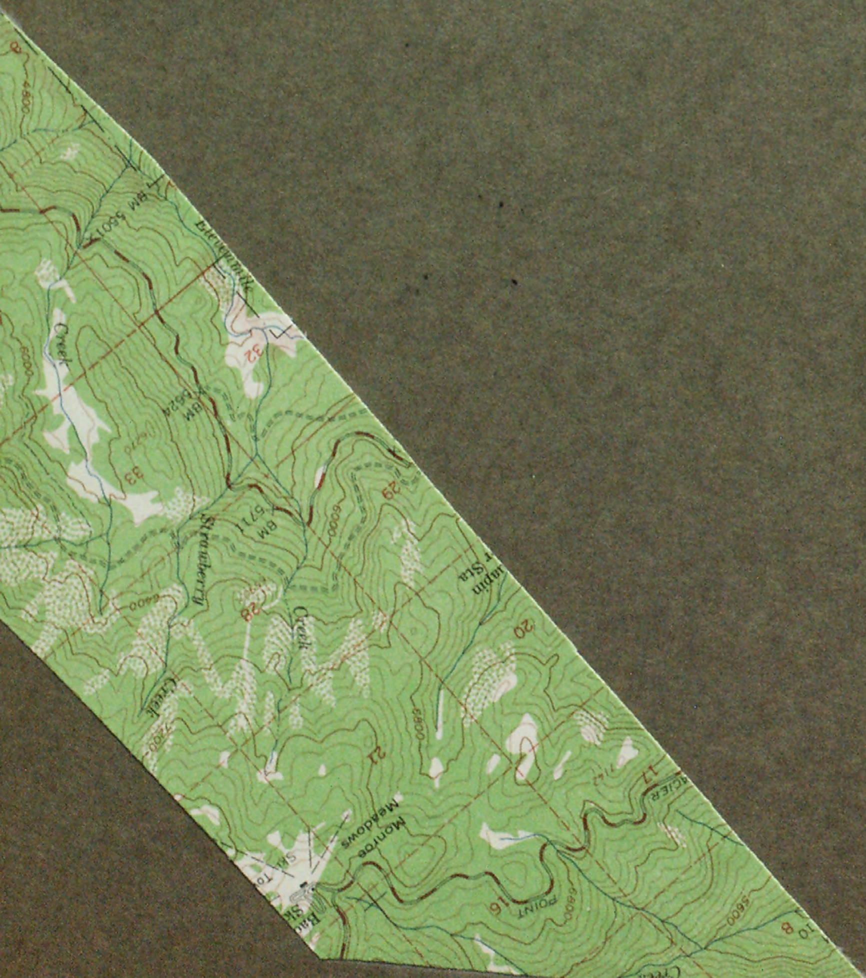
U. S. GEOLOGICAL SURVEY.

Reports-open file series, No. 636: 1955.



U.S. Geological Survey.

Reports-open file series:

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

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

By Roger M. Waller, 1926-

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 near-surface 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 considerably 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 to 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.