MINERAL INVESTIGATIONS IN SOUTHEASTERN ALASKA

By A. F. Buddington

INTRODUCTION

In the Sitka district the continued operation of the Chicagoff and Hirst-Chicagof gold mines and the installation and operation of a new mill at the Apex-El Nido property in 1924, all on Chichagof Island, have stimulated a renewed interest in prospecting for gold ores.

In the Juneau district a belt of metamorphic rock, which extends from Funter Bay to Hawk Inlet on Admiralty Island and contains a great number of large, well-defined quartz fissure veins, was being prospected on the properties of the Admiralty-Alaska Gold Mining Co. and the Alaska-Dano Co. on Funter Bay and of Charles Williams and others on Hawk Inlet. The Admiralty-Alaska Co. was driving a long tunnel which is designed to cut at depth several large quartz veins. On the Charles Williams property a long shoot of ore has been proved on one vein and a large quantity of quartz that assays low in gold.

In the Wrangell district the only property being prospected during 1924 to an extent greater than that required for assessment work was the silver-lead vein on the Lake claims, east of Wrangell.

In the Ketchikan district, as reported, the Dunton gold mine, near Hollis, was operated during 1924 by the Kasaan Gold Co. and the Salt Chuck palladium-copper mine by the Alaskan Palladium Co., and development work on a copper prospect was being carried on at Lake Bay.

In the Hyder district the outstanding feature for 1924 has been the development of ore shoots at the Riverside property to the stage which has been deemed sufficient to warrant construction of a 50-ton mill to treat the ore by a combination of tables and flotation. The valuable metals in the ore are gold, silver, and lead. Development work was being carried forward on the Daly-Alaska property, and good ore shoots are reported to have been found in crosscuts. On Fish Creek the Hovland group was in process of development by

Arthur Moa and associates, of Ketchikan, and it is reported that a tunnel will be started on the Fish Creek property. On Texas Creek several new discoveries of gold-silver-lead veins have been made. The Forest Service expects to have a pack trail for horses completed to the Chickamin Glacier by fall.

GOLD PROSPECTS

FUNTER BAY TO HAWK INLET, ADMIRALTY ISLAND

General geology.—A belt of schist and phyllite, with a great number of well-defined quartz fissure veins, extends for about 7 miles from Funter Bay to Hawk Inlet, on Admiralty Island. On the Funter Bay side of Mount Robert Barron the veins of this belt were being prospected on the properties of the Admiralty-Alaska and Alaska-Dano companies (Nowell-Otterson) and on the Hawk Inlet side by Charles Williams and others. Funter Bay is on the north end of Admiralty Island, about 18 miles west of Juneau in a direct line, but 50 miles by water route. Hawk Inlet is about 13 miles south of Funter Bay. Both inlets have deep water to the head and afford favorable sites for docks in many places. A range of mountains extends from Funter Bay to Hawk Inlet with a maximum altitude of 3,450 feet on Mount Robert Barron. The slopes are forested to an altitude of about 2,500 feet, and there is adequate timber for mining uses. The mineralized belt on Funter Bay has been previously described by Wright,[1] Eakin,[2] and Mertie.[3]

The schists include three general types—greenstone schists, light-colored micaceous quartz schist, and black crinkled graphitic phyllite.

The greenstone schists form the predominant country rock in the Funter Bay area. Mertie describes them as comprising chlorite schist, mica schist, quartz-chlorite schist, quartz-chlorite-mica schist, zoisite-chlorite schist, albite-zoisite schist, albite-chlorite schist, and albite-mica schist. A specimen of the rock from the face of the tunnel on the Admiralty-Alaska property, 2,200 feet from the portal, consists of quartz, epidote, chlorite, and albite, with a little calcite, zoisite, actinolite, titanite, and apatite.

Quartz schist with mica along the foliation planes is the country rock north-northwest and northwest of the main camp on the Charles Williams property, including the summit ridge. At Funter Bay similar schist appears to overlie the greenstone schists and come in

[1] Wright, C. W., A reconnaissance of Admiralty Island: U. S. Geol. Survey Bull. 287, pp. 147–150, 1906.

[2] Eakin, H. M., Lode mining in the Juneau gold belt: U. S. Geol. Survey Bull. 662, pp. 84–92, 1917.

[3] Mertie, J. B., Lode mining in the Juneau and Ketchikan districts: U. S. Geol. Survey Bull. 714, pp. 113–118, 1921.

just above the Heckler blanket vein on the Admiralty-Alaska property, at an altitude of about 1,300 feet. The quartz schist is also present on the Alaska-Dano property. Black graphitic phyllite is intercalated in the quartz schist and greenish chloritic schist, in the beds near the greenstone schist contact. A typical specimen of the quartz schist was found to consist of quartz associated with considerable microperthite and with a little muscovite.

The phyllite forms the country rock on the Charles Williams property between the house on the shore and the main camp. The beds usually consist of crinkled black graphitic phyllite with local slickensided and crumpled zones, intimately penetrated by thin quartz seams. Both the quartz veins and the phyllite in many places show isoclinal plication.

Eakin[4] states that the bedded rocks on the Admiralty-Alaska property in general lie in broad and gentle folds, though locally intense crumpling and close folding on a small scale are apparent, and that over considerable areas both schistosity and bedding are near the horizontal. The schists of the belt near Funter Bay have in part a northeast strike. At the southeast end of the Alaska-Dano property, on the other hand, the schists strike N. 20° W. and dip steeply eastward; on the Williams property they strike mainly between N. 20° W. and N. 10° E. and dip 40°–90° E.; and along Hawk Inlet, south of the Williams property, they strike from N. 20° W. to N. 40° W.

Near Funter Bay there are two sets of quartz veins, one striking N. 45°–60° E., and the other N. 20°–35° W., approximately parallel to the strike of the schists. On the Williams property the veins strike chiefly between N. 15° E. and N. 30° E., or 20° to 30° more to the east than the schists and phyllites, and dip steeply eastward. The walls of the veins are very commonly slickensided and polished.

In the Funter Bay area several varieties of igneous rock have been described by Mertie,[5] including albite granite, albite diorite, and albite trachyte. In the tunnel on the Admiralty-Alaska property there are dikes of sodic trachyte at 400 and 900 feet from the portal of the tunnel. At the surface, about 100 feet southeast of the place where the air pipe line crosses the water ditch, there is a dike of highly altered diorite. This rock is completely recrystallized to an aggregate of uralite, zoisite, chlorite, and albite. Another similar mass of intensely altered and recrystallized diorite is exposed along the ditch under the cable. Mertie[6] discusses the significance of the sodic or albitic character of these rocks as follows:

> This feature is of more than passing interest when considered in relation to the sodic character of the intrusive rock at the Treadwell mines, on Douglas

[4] Op. cit., p. 35. [5] Op. cit., pp. 114–115. [6] Op. cit., p. 115.

Island, about 15 miles to the east. It is not unlikely that mineralization at these two localities took place at the same general period and had a similar origin.

Eakin[7] gives the following description of the structural relations of the quartz veins:

> Joint systems on both large and small scales cut the bedded rocks at high angles with the schistosity and bedding or near the vertical. The major joint planes in places persist for hundreds and even for a thousand feet or more with great regularity in strike and dip. Such large fractures were probably accompanied by some differential movement between the blocks which they separate, but there is no definite evidence of the maximum displacement. These planes are generally marked by quartz veins, which range in thickness, in the different individuals observed, from mere films to nearly 60 feet. At one locality four approximately parallel veins were measured in a section 330 feet across, whose thickness aggregated 90 feet. * * * T-shaped and L-shaped bends in some of the veins indicate differential movements amounting to at least the thickness of the veins. Other veins which gradually thin out to their ends do not have this significance. Faults later than the veins and offsetting them occur only here and there, according to present evidence.

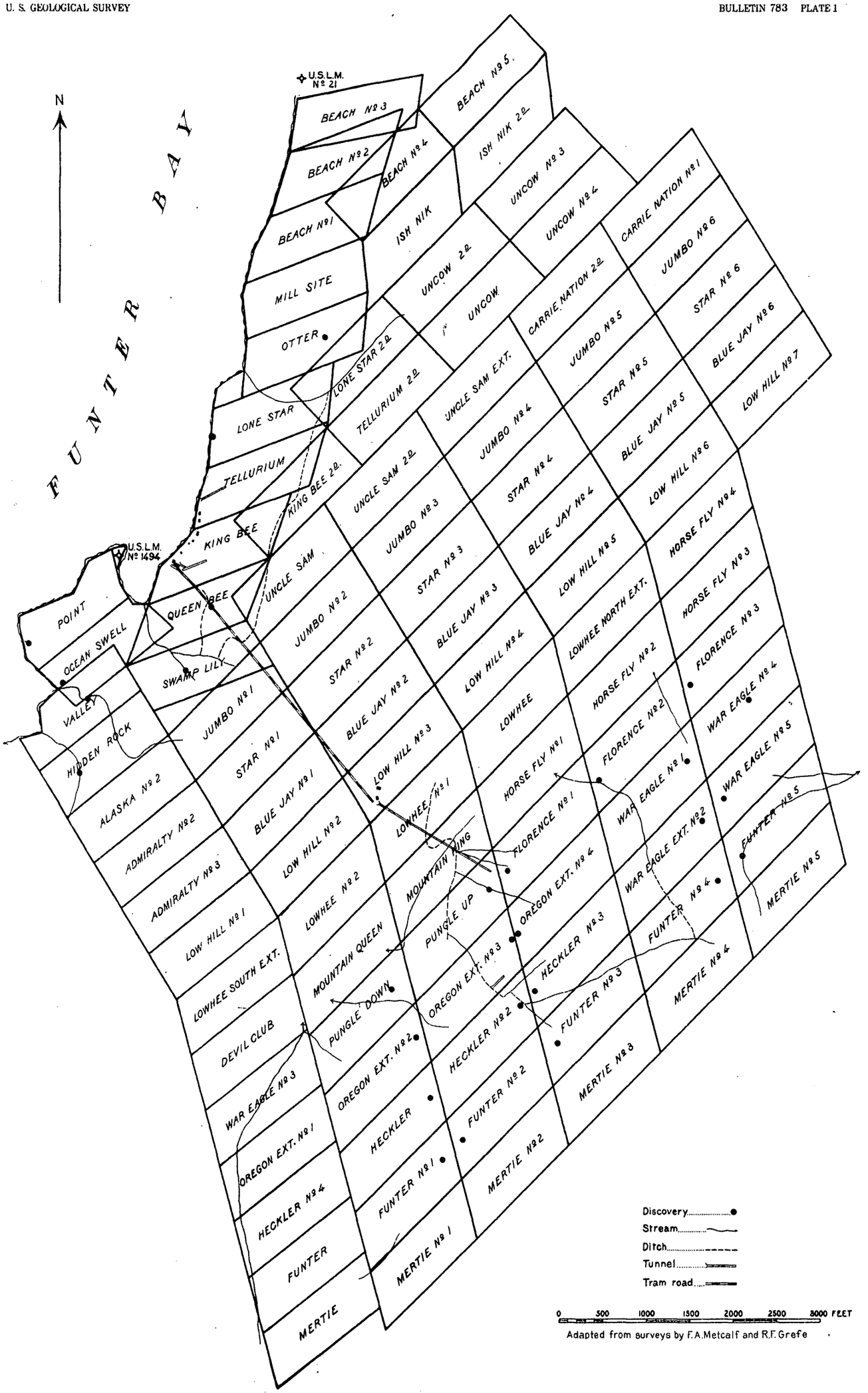
There are abundant quartz veins in this belt, and some of them are very large. Mertie[8] states that the Big Thing lode, on the Nowell-Otterson group, has been traced for a length of 2,300 feet and at one point is 20 feet wide. On the Williams property at the summit ridge there is also a vein which has been traced for over 2,000 feet and which has a width of 20 to 50 feet. Eakin[9] refers to a vein on the Heckler claims of the Admiralty-Alaska property, which has a width of 57 feet and is said to consist of ore.

Some of the large quartz veins have been proved to carry gold ore shoots of low or medium to high grade, and some to carry large quantities of quartz that assays low in gold.

In general the quartz is white, milky, and massive, but locally it shows comb or drusy structure and is associated with masses of iron-bearing carbonate (ankerite) or at the surface with limonite resulting from the weathering of the carbonate and sulphides. The auriferous quartz is commonly iron stained or sparsely metallized with one or more of the minerals pyrite, pyrrhotite, sphalerite, galena, chalcopyrite, specular hematite, and native gold. Extensive, thorough, systematic assaying is necessary at present to distinguish the ore shoots from the barren or relatively barren portions of the vein.

Admiralty-Alaska property.—A claim map of the property of the Admiralty-Alaska Gold Mining Co., comprising some 100 claims, is shown in Plate 1. Since 1919, the time of Mertie's visit, the crosscut tunnel designed to intersect several big quartz veins has been extended to a point 2,200 feet from the portal. Probably it will be necessary to continue the tunnel for several hundred feet farther

[7] Op. cit., p. 85. [8] Op. cit., p. 117. [9] Op. cit., p. 91.



Adapted from surveys by F. A. Metcalf and R. F. Grefe

MAP SHOWING CLAIMS IN THE VICINITY OF FUNTER BAY, ALASKA

to cut the veins. About 200 feet of exploratory drifts have been driven from the tunnel. The rock in which the tunnel is driven consists of several varieties of greenstone schist, with an intercalated zone of quartz and graphitic schists. The quartz and graphitic schists are full of small quartz seams and stringers parallel to the bedding and occur between 500 to 700 feet from the portal. The beds in general strike about at right angles to the tunnel (S. 60° E.) and dip gently southeastward, but they are cross folded and warped, with axes pitching southeastward, so that locally the schists strike parallel to the tunnel and dip steeply. The country rock with small quartz stringers parallel to the cleavage is reported to carry only a very small amount of gold.

About 1,250 feet from the tunnel portal the Lowhee vein was cut and drifted upon for 100 feet N. 60° E. This vein is 2 to 3 feet thick throughout the drift but pinches to a thin facing of the fracture in the breast of the drift. In the roof of the tunnel the vein pinches, and its extension to the southwest appears to be indicated by bunches of quartz which are exposed in a short drift. The vein matter shows very sparse sulphides, including pyrite, pyrrhotite, chalcopyrite, and galena in a gangue of quartz. The vein is reported to average $4 to the ton in gold.

At about 2,100 feet from the portal there is a seam of almost solid pyrrhotite, which ranges from a fraction of an inch to 3 inches in width and has been traced for 100 feet. It passes into a quartz stringer and is itself associated with quartz. A specimen of this sulphide was examined for the nickel mineral pentlandite, but none was found.

At an altitude of about 1,200 feet a large open cut has been made on the Heckler blanket vein. At the top of the cut this vein is 6 inches to a foot wide, but it widens downward and is reported to be 20 feet wide at the bottom of the cut. Quartz veins make offshoots into the footwall. The vein strikes northeastward and dips 50°–90° E. Aplite is reported to form the footwall and schist the hanging wall. The vein is of the fissure type and lies at an angle to the dip of the schist. The upper, narrow portion of the vein is reported to have given assays of $200 to $300 to the ton in gold, and specimens very rich in free gold have been obtained here. At the base of the open cut 5 feet of the vein, consisting of quartz and ankerite with many inclusions of the country rock that forms the hanging-wall portion of the vein, is reported to have averaged $10 in gold to the ton. The rest of the vein gave very low assays. The ankerite has sparse disseminated sulphides, including pyrite, pyrrhotite, chalcopyrite, and sphalerite. The rich vein matter at the top of the open cut is especially associated with sphalerite. Open spaces lined with quartz crystals and films of sericite are

common in the quartz. Veinlets of sericite also occur in the ankerite.

On the War Eagle Extension claim No. 2, at an altitude of about 1,650 to 1,700 feet, a dike of troctolite, locally containing disseminations of sulphide blebs, has been exposed by trenching. The sulphides consist predominantly of pyrrhotite with a little chalcopyrite and pentlandite, and a brief description of the ore occurrence is given in an earier bulletin.[10] A somewhat more detailed description is given here.

The dike rock consists of about 55 per cent labradorite, 39 per cent olivine, 4 per cent pyroxene, and 2 per cent magnetite. The magnetite occurs both as minute crystals disseminated in the olivine and as grains interstitial to the pyroxene. The olivine occurs as grains of early crystallization in a groundmass of labradorite with a diabasic texture. The pyroxene is wholly interstitial to the plagioclase. The olivine in places is partly to completely altered to aggregates of serpentine or talc and iron oxides. Carbonate, chlorite, actinolite, and biotite are present locally as secondary minerals. The serpentine and secondary minerals are of later origin than the sulphides. The sulphides form irregular-shaped blebs, locally in irregular veinlike forms for half an inch or so, interstitial to the silicate minerals. Generally the sulphides are molded against idiomorphic crystal faces of the silicates, but in places they corrode and partly replace the silicates. Magnetite of two generations is present, the older occurring as abundant minute euhedral crystals disseminated throughout the silicates and the younger as larger grains interstitial to the silicates or as crystals and grains on the outer borders of the sulphide blebs. Magnetite locally occurs as a group of crystals with perfect borders within the sulphides. In places it shows a little corrosion by the sulphides. Rarely pyrite crystals occur within the sulphide masses but are usually on their outer borders. The magnetite and pyrite were the first metallic minerals to crystallize. A little chalcopyrite is present. It is restricted almost exclusively to the outer borders of the sulphide blebs and assumes elongate narrow shapes, with one side against the silicates and rounded borders against the pyrrhotite. It appears to precede the pyrrhotite and pentlandite. The pentlandite occurs as stringlike veinlets crossing the pyrrhotite and as fringes bordering the pyrrhotite blebs and has therefore crystallized later than the pyrrhotite. The sulphides, though showing an order of crystallization, are yet essentially contemporaneous and, taken as a whole, belong to a late stage in the consolidation of the dike magma and are themselves of magmatic origin.

[10] Buddington, A. F., Mineral investigations in southeastern Alaska: U. S. Geol. Survey Bull. 773, pp. 71–139, 1925.

Charles Williams property.—The Charles Williams property was located in 1919 and has been systematically prospected to the present time. Ninety-six claims have been located and surveyed and are shown on the claim map that forms Plate 2. They extend in a north-northwesterly direction 3½ miles from the cove west of the basin at the head of Hawk Inlet. At the beach there are two cabins and a floating wharf. A pack road runs from this place 1½ miles north-northwest to another camp at an altitude of about 1,000 feet, where there is a large bunk house, a well-equipped assay office, and a blacksmith shop. Trails lead from this place to the other prospects.

A great number of large, well-defined quartz fissure veins are being prospected. Several open cuts have been made on each of 10 veins, and each has thus been traced for 500 feet or more. There are many other bodies of quartz on the property which have been only slightly prospected if at all. A large shoot of low to medium grade ore has been proved definitely to occur in one of these veins, and other veins are reported to carry shoots of low to medium grade ore or to consist of large volumes of low-grade mineralized rock.

A vein that crosses the boundary between Williams No. 4 claim and Batella No. 1 has been developed by a tunnel driven 353 feet on the vein, a winze sunk 48 feet in the vein on the hanging-wall side at the entrance to the tunnel, and four open cuts at the surface. The vein is in graphitic schistose phyllite. The portal of the tunnel is at an altitude of about 1,000 feet. The relation of the tunnel to the vein is shown in Plate 3. The vein is about 18 feet wide at the entrance to the tunnel. At a point 230 feet from the portal the tunnel and a crosscut expose both the hanging wall and footwall, giving a thickness of about 14 feet. At 80 feet beyond this point the vein consists of quartz, with leaves and horses of schist on the footwall side, and is about 10 feet thick. At about 325 feet from the portal the vein gives place abruptly to a zone of highly crumpled graphitic schist with sparse quartz stringers. The distribution of gold in the vein is variable, both lengthwise and across it.

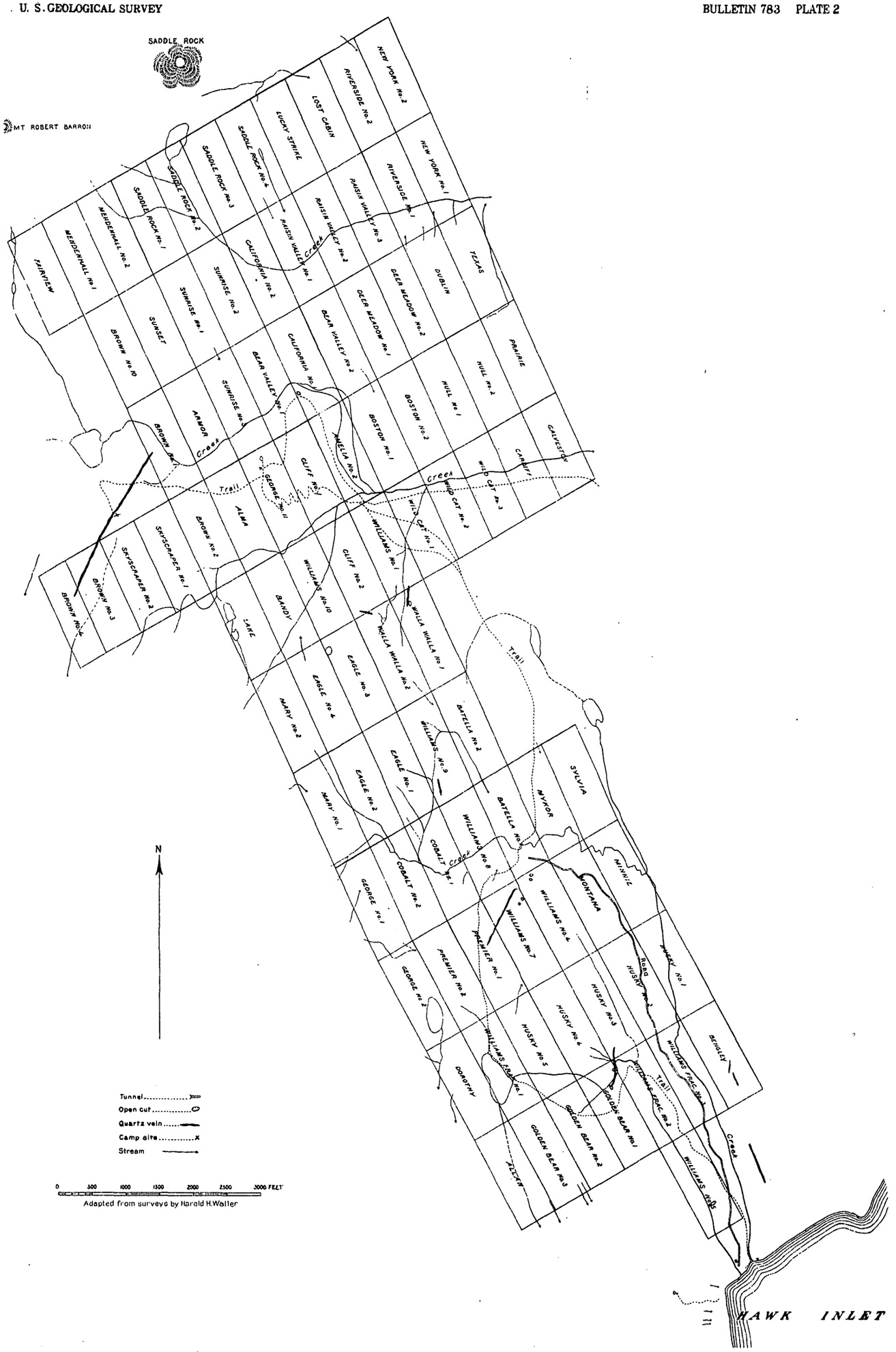
The vein in the tunnel was systematically sampled by H. E. Linney for R. K. Neill. The assay values plotted on the chart shown in Plate 3 are a few taken from his assay chart to illustrate in a representative manner the distribution of the gold. The samples were taken across the working face of the tunnel on successive dates. Harry Townsend, a representative of the United States Bureau of Mines, took samples the full width of the tunnel and both crosscuts, and the values obtained by him are also plotted on the chart. They agree with results obtained by the assayer for Neill. The average of 235 samples taken systematically from the face of the tunnel and from the muck of cars trammed to the dump is reported to be

$12 a ton for the first 172 feet. The average of the assays for the next 90 feet is a little over $7, and that for the last 55 feet of the vein only a little over $1. An open cut about 40 feet above the level of the tunnel exposes about 31 feet of quartz that is reported to average $20 to the ton.

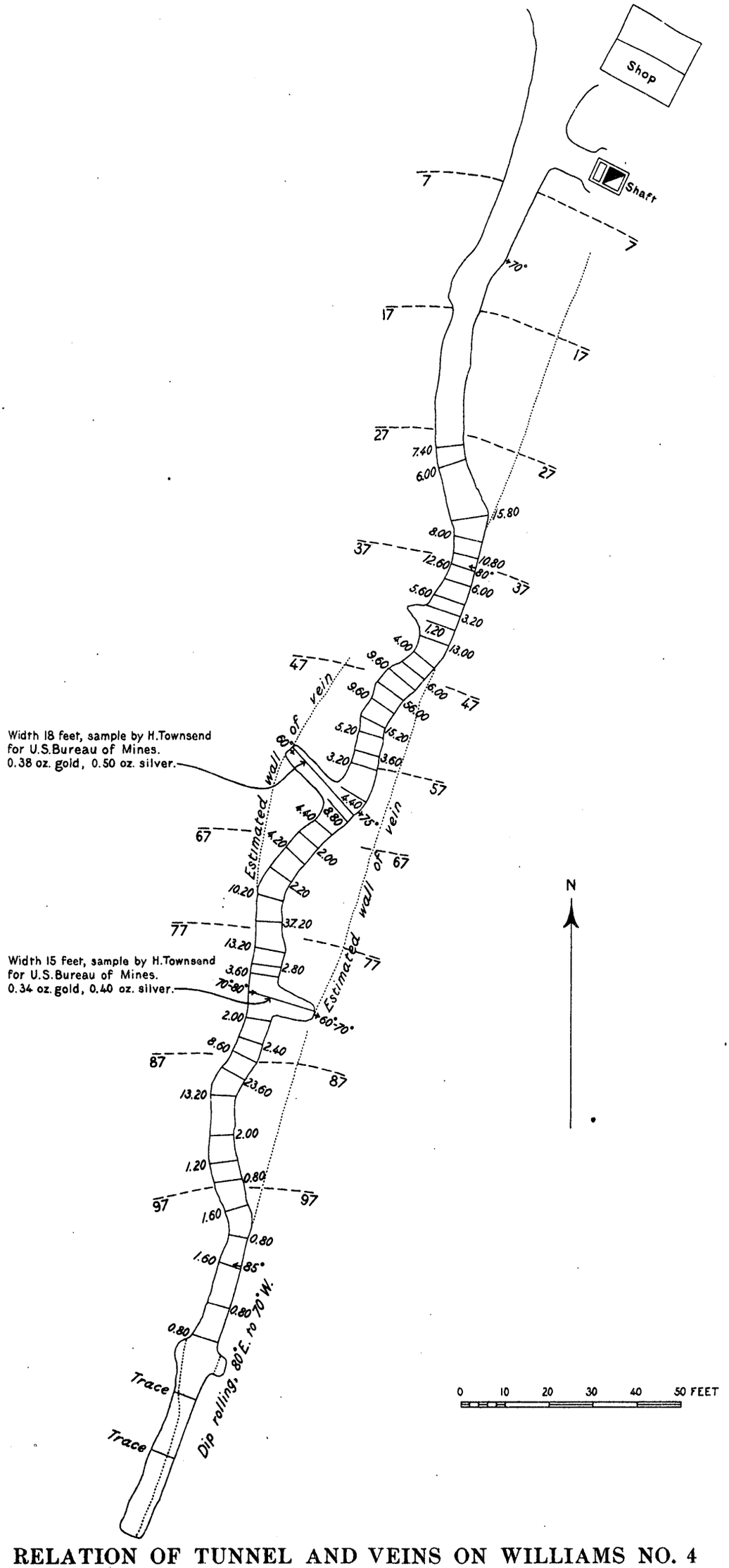
North of the tunnel portal quartz has been found in a series of open cuts aligned along the projected extension of the vein for about 500 feet. To the south, up the hill slope, along the line of strike of the vein, several open cuts expose stringers of quartz from 4 inches to 1 foot wide along joint planes in the phyllites, but no well-defined vein. Southwest of this line of open cuts another series of open cuts on Williams No. 7 and Premier No. 1 claims has been made on a quartz vein that has been traced for more than 800 feet. The general strike of this vein at the higher altitudes (about 1,500 feet) is north-northeast. About 160 feet below this place the vein is either faulted or else takes an abrupt turn to the east and is traceable to a point within 300 feet of the southwest end of the vein on which the tunnel has been driven. This fact suggests that this vein may be the continuation of the vein in the tunnel offset by faulting, or possibly the same vein which has come in along two fractures with essentially parallel strikes and a connecting fracture. The manner of termination of the vein in the tunnel does not resemble faulting. Only further work can fully reveal the relations of these two veins. At an altitude of about 1,500 feet an open cut exposed 2½ feet of quartz with slickensided walls. This material is reported to average $14 to the ton in gold. About 30 feet below this place another open cut exposes 16 feet of quartz that is reported to average about $4. Where the vein takes an abrupt turn to the east there is a width of about 10 feet exposed.

Between altitudes of about 875 and 1,050 feet a quartz vein is exposed on Golden Bear No. 1 claim and Husky No. 3. This vein, which is known as the Iron Swamp lead, is reached by a trail from the cabin at the beach, a distance of about three-fourths of a mile. The vein is well exposed for part of its length along a canyon and has been prospected by open cuts and traced for a length of 600 feet. At the north end the vein strikes a little north of east, and at the south end north-northeast. About 5 feet of quartz is exposed at the north end, and about 20 feet at the south end. Gold assays are reported by R. W. Moore to range from $1 to $14 to the ton and to average about $4. The quartz is locally iron stained but predominantly milky.

About 300 yards up the canyon back of the house at the beach, at an altitude of about 300 feet on Williams No. 5 claim, a wide quartz vein with a horse of schist is exposed in an open cut. A tunnel that



MAP SHOWING CLAIMS OF THE CHARLES WILLIAMS PROPERTY, HAWK INLET, ADMIRALTY ISLAND, ALASKA



RELATION OF TUNNEL AND VEINS ON WILLIAMS NO. 4 AND BATELLA NO. 1 CLAIMS, HAWK INLET, ALASKA

has been driven near the base of the canyon through the wall rock of schist intersects this vein. It is reported that a 50-foot width of quartz has averaged $3.60 to the ton. In the direction of the strike of this vein, near the northeast end of Williams No. 5 claim, there is an open cut on a vein of milky-white quartz 8 feet in width that is reported to average $3 to the ton. This vein is reported to be traceable for 1,500 feet.

Three quartz veins are also exposed on the east side of the creek that enters the cove east of the cabin, but these were not visited.

On Batella No. 2 claim, about one-third of a mile north-northwest of the main camp, a quartz vein is exposed in blanket-like form along the face of a hill. The vein has not been prospected. It occurs in quartz schist, and its dip and strike are approximately the same as the slope and trend of the hillside. Free gold was observed at one place in oxidized pyrite.

On Walla Walla No. 1 claim another quartz vein has been prospected by open cuts. This vein is at an altitude of about 1,750 feet and is 2 miles in a straight line north-northwest of the cabin at the beach. This vein strikes a little west of true north and is vertical. About 15 feet of quartz is exposed at the north open cut and several feet at the south open cut, and the vein is traceable for several hundred feet. The vein is of milky quartz and contains narrow bands sparsely mineralized with pyrite and numerous films of micaceous schist.

On George No. 11 claim, at an altitude of about 1,900 feet, a little over 3 miles by trail from the beach, is a quartz vein which has been prospected by an open cut. The vein is in quartz schist and on the west side consists of 2½ feet of quartz moderately metallized with pyrite, with many vugs lined with quartz crystals and with bands of comb quartz. A 135-pound specimen very rich in native gold is reported to have come from this vein. Some ankerite is also present in the vein.

At an altitude of about 2,850 feet, 3 miles in a straight line north-northwest of the house at the beach, a tunnel has been driven 36 feet on a quartz vein. This vein is 20 feet wide at this point. To the northwest it widens to 50 feet and includes horses of quartz schist. The vein has been traced for 2,400 feet. It is characterized by the presence of considerable dark-brown ankerite in the central portion, and open spaces lined with quartz crystals are very common. Local narrow shoots metallized with sparse disseminated galena or pyrite were noted. A sample from the tunnel is reported to assay $6 a ton in gold. The quartz vein occurs in quartz schist adjacent to a quartz-albite schist of the Funter Bay type containing accessory chlorite, muscovite, and epidote. There are many strongly defined quartz veins in this vicinity.

A vein about 1,000 feet N. 60° W. of the house at the beach has been prospected by an open cut and adit, which revealed quartz sparsely metallized with pyrite, sphalerite, galena, and chalcopyrite.

On Williams No. 8 claim a strongly defined iron-stained quartz vein, with sparsely disseminated pyrite, is exposed in the bed of a creek. An open cut has been made on this vein, and samples are reported to have given only low returns in gold. Further work is contemplated here, as the vein matter seems to be similar to that which gives higher assays elsewhere on the property.

Several other quartz veins are reported to be exposed on this property, but they have not been prospected and were not visited by the writer.

PROPERTY OF DOUGLAS MINING CO.

The claims of the Douglas Mining Co. are on Douglas Island, about 1¼ miles southwest of Douglas at an altitude of about 650 feet. The property is reached by a trail.

A sheet of highly altered diorite in black slate is being prospected. A tunnel 120 feet long starts in slate and completely crosscuts the diorite sheet, which shows a thickness of about 70 feet. The slate is almost vertical and strikes northwest. The diorite strikes northwest and dips slightly to the southwest, crosscutting the slate. There are many slickensided surfaces within the dike. The diorite at and near the footwall is fresh. Above the tunnel it is exposed by a trench, and it has been traced along the strike by several trenches along the beds of gulches.

Locally a few small, narrow, irregular stringers of quartz occur along fractures in the diorite. These stringers consist of glassy material containing considerable calcite and sparse grains of disseminated chalcopyrite, pyrite, and sphalerite. The diorite is metallized locally with abundant disseminated fine cubes of pyrite.

The diorite in the tunnel is reported to give an average assay value for the full width of $1.50 to $2 to the ton. One zone 4 feet wide is reported to average $3 to the ton, and another 3 feet wide about $3.50 to the ton.

CLARK PROSPECT

The Clark prospect, staked in 1911, is about 6½ miles a trifle north of true east of Juneau, on Gold Branch of Carlson Creek. It is about the same distance a little west of true north of Sunny Cove. It may be reached either by way of the valley of Carlson Creek from Sunny Cove or by road from Juneau up Gold Creek to Granite Creek, by trail up Granite Creek, and thence over the divide at 3,100 feet to the valley of Gold Branch at an altitude of about 1,200 feet.

The property comprises six claims. Four of these claims (Hulda A, Cheechako, Yellow Hornet, and Isaiah R) extend parallel to the valley of Gold Branch on the north side and reach the west side of the valley of Carlson Creek. A crosscut tunnel 150 feet long has been driven on the Cheechako claim. The John W. and William N. claims extend up the mountain.

The country rock consists of schist and pegmatitic injection gneiss with rare sheets of quartz diorite and sparse dikes of basalt.

The mineral deposits are quartz veins, which for the most part cut across the strike of the cleavage of the formation and fill highly brecciated fissure zones. The vein material consists of milky quartz with sparse to abundant small angular silicified and altered inclusions of the country rock. The quartz usually shows abundant vugs and open spaces lined with quartz crystals. The included fragments of country rock are as a rule full of disseminated small cubes of pyrite. In places the veins consist of highly altered country rock with a reticulating network of quartz veinlets. The sulphides in the vein are small in amount and predominantly pyrite. Stibnite occurs in needle forms in bands and disseminated in the quartz on the John W. and William N. claims at an altitude of about 2,100 feet. Arsenopyrite, sphalerite, and galena are also found.

On the John W. claim a vein striking N. 30° W. and dipping 75° E. stands out boldly in the face of the mountain between altitudes of about 1,600 and 1,850 feet. There is 4 or 5 feet of the vein exposed without either wall being shown.

On the William N. claim an area has been stripped which shows a maximum width of vein of 20 feet. This vein strikes about north. Some of the quartz here is accompanied by stibnite. A specimen of the vein matter with stibnite is reported to have assayed $2.80 in gold and $4.25 in silver to the ton (the silver being computed at $1 an ounce). Another sample from the same vein yielded 0.16 ounce of gold to the ton.

On the Cheechako claim a quartz vein is exposed in the gulch above the tunnel and extends northeastward to the adjoining gulch. The gulch appears to mark the course of a fault. The vein turns and runs lengthwise of the gulch and has been partly exposed by sluicing off the overburden. About 100 yards down the gulch a great width of quartz is again exposed and the vein resumes its northeast strike. On the side of the gulch 20 feet of vein matter is exposed on the uphill side of a basalt dike and 5 feet on the downhill side. On the uphill side the overburden has been sluiced off and the vein exposed for a length of 100 feet. The exposures are inadequate to show the relations certainly, but the basalt appears to intrude the quartz vein. The basalt itself is offset by faults of small displace-

ment. Considerable country rock is included in one zone of the wide part of the vein.

Other bodies of quartz have been exposed by strippings on the other claims.

The writer is indebted to E. F. Clark, of Washington, D. C., for the following data on assays made by Ledoux & Co. of samples collected by him from the vein on the Cheechako claim: Sample from vein below basalt dike on Cheechako claim, 1.03 ounces gold ($21.29) to the ton of 2,000 pounds; two samples from vein above basalt dike, 0.23 ounce gold ($4.75) and 0.13 ounce gold ($2.69) to the ton; sample from vein west of falls above tunnel, 0.12 ounce gold ($4.38) to the ton; sample from east end of Cheechako claim, 0.17 ounce gold ($3.51) to the ton.

Considerable bodies of quartz which are exposed on this property apparently yield small amounts of gold.

MARTIN SAXE PROSPECT

A gold prospect comprising four claims is held by Martin Saxe, of Klawak, on the west coast of Prince of Wales Island, Ketchikan district. The prospect is on the south side of the basin, at the head of the valley whose stream enters Klawak Lake at the abandoned hatchery. The vein is exposed in the bed of a small stream at the head of the basin, on the south side, at an altitude of about 1,450 feet. Considerable float occurs in the bed of the stream well below the outcrop. The prospect is reached from Klawak by 1½ miles of trail to Klawak Lake, by rowboat on the lake 4 miles to a point about a mile beyond the hatchery, and then by blazed trail to the prospect. It may also be reached by going up the stream valley which comes out at the hatchery. The prospect is about 2 miles back from the lake. Klawak is served by mail boat from Ketchikan. The property has timber and also a waterfall adequate to develop all necessary water power for mining use.

The vein is in a massive green andesite porphyry breccia. Dikes of diorite cut the greenstone in the mountain above the prospect. The ore deposit is a sheeted quartz fissure vein. At an altitude of about 1,450 feet a small open cut has been made. The vein zone thus exposed is about 10 feet wide and carries half a dozen quartz stringers, the largest 6 inches wide, and on the south side a quartz vein 2 feet wide. The vein zone is exposed in the bed of the stream for a difference in altitude of about 250 feet above the open cut. At least one quartz vein 1 to 2 feet wide is exposed throughout this height, and usually one or more additional stringers are present. The extension above and below is covered.

The quartz in some of the stringers is mineralized with disseminated pyrite. In the wide vein of the open cut the quartz is

heavily metallized with galena, pyrite, sphalerite, and a trace of chalcopyrite. The gangue consists of colorless to milky and rose-colored quartz, associated with considerable carbonate. Some of the quartz shows comb structure.

A grab sample from the heavily metallized vein in the open cut was submitted to the Geological Survey for analysis. E. T. Erickson reports the gold as 0.07 ounce and silver 1.96 ounces to the ton. A grab sample from a sparsely metallized stringer consisting of rose quartz and carbonate gave 0.24 ounce silver and 0.07 ounce gold. Higher assays in gold and silver are also reported.

The country rock between the quartz stringers is impregnated with pyrite, and in many places the fractured surfaces of the greenstone are coated with quartz carrying pyrrhotite.

HYDER DISTRICT

In 1924 development work in excess of that required to satisfy assessment requirements was carried on at the Riverside, Daly-Alaska, and Ibex properties, in the Hyder district. Developments at the Riverside have been previously described.[11] The Daly-Alaska property was not visited by the writer, but large ore shoots are reported to have been cut in underground workings.

On the Ibex No. 1 claim a vein is exposed in bedded argillite and quartzite for about 100 feet in length and 75 feet in altitude. It pinches and swells, but considerable portions of it are 15 to 24 inches in width. The sulphides consist almost wholly of interbanded sphalerite and galena. A little tetrahedrite is present locally. The vein is cut by a granite dike and offset by faulting. A half interest in this property was sold to Day Bros., of Idaho, who drove a crosscut adit tunnel 131 feet in length about 100 feet below the top of the open cut and failed to find the ore body. Work was then abandoned.

A crosscut adit is reported to have been driven by Carlson & Hewitt to the Homestake vein 35 feet below the outcrop and to have cut the vein.

Dominick Bevacque located five claims on a vein on the east side of Ferguson Glacier, about a quarter of a mile above its terminus. The vein is reported to have been traced for several hundred feet and to have a maximum width of 3½ feet. Heavily metallized ore shoots yielding good assays in gold, silver, and lead are reported to be present in this vein.

In May, 1924, Carlson & Hewitt located a new vein on the west fork of Texas Creek, in the vicinity of the Ibex group of claims and staked a new claim under the name Ibex No. 7. The vein is at an altitude of about 1,300 feet above the cabin and is exposed in the

[11] Buddington, A. F., Mineral investigations in southeastern Alaska: U. S. Geol. Survey Bull. 773, pp. 71–139, 1925.

bed of Ibex Creek. The vein has been traced for several hundred feet and ranges from 5 inches to 3 feet in width. At the north end, where it passes beneath snow lying in a gulch, the vein consists of a fissure zone of granodiorite with stringers of quartz for a width of 3 feet. Heavily metallized shoots of sulphides, comprising galena with a little pyrite, occur along the vein. The vein is in granodiorite, strikes about N. 10° W., dips east, and is locally broken by faults of slight displacement.

MOUNTAIN VIEW GROUP

The Mountain View group comprises eight claims and a fraction and lies mainly between Skookum and Fish creeks, just above their junction but in part below it. Five of the claims are patented by John Hovland. The property is under bond to a group of Ketchikan business men and has been undergoing active development since June in charge of Arthur Moa.

Most of the work to date on this property has been done on three veins, though several other quartz veins and stringers have been found on the property.

On Fish Creek No. 3 claim a quartz fissure vein with mineralized shoots has been prospected by several open cuts and stripping, and a tunnel is now being driven along it. The vein is in granodiorite and has been traced for 400 feet. Its strike is about N. 7° E. and its dip 45°–50° E. The southern 250 feet of the vein ranges from 3 to 4 feet in width. North of this the vein splits into two branches about 10 feet apart. The upper one is several inches thick and carries shoots of ore. The lower vein is the main branch and for 75 feet ranges from 6 inches to 2 feet in width, averaging about a foot, but for the next 75 feet it ranges between 5 and 9 inches in width. The vein throughout shows many moderately to heavily mineralized shoots of ore. The sulphides consist of pyrite, galena, pyrrhotite, chalcopyrite, sphalerite, and sparse tetrahedrite.

On Fish Creek No. 2 claim a vein has been traced by five open cuts for a length of 300 feet. It strikes N. 50° W. and dips 40° NE. The southeastern portion of the vein, as shown by two open cuts and a crosscut tunel, is pyritic quartz. In the open cut above the tunnel the vein zone is 6 to 8 feet thick with 5 to 6 feet of mineralized quartz, and the remainder consists of included bands and fragments of country rock, which here is granodiorite. The quartz is heavily mineralized with bands and disseminations of coarsely crystalline pyrite, which may form as much as half the vein by volume. About 20 feet below the open cut a 40-foot crosscut tunnel has been driven to cut the vein. At the end of the tunnel there is a 1½-foot vein of quartz heavily mineralized with pyrite. Small quartz stringers are present above this vein, and it is not certain that the hanging wall

of the vein zone has been reached. Another open cut has been made 15 feet west of the open cut above the tunnel. On the east wall of this cut the vein consists predominantly of two mineralized shoots. One of these shoots is a quartz vein 2 feet thick, very heavy mineralized with pyrite, which pinches to a narrow stringer in the face of the open cut. The other shoot consists of fine crystalline barite and carbonate with seams and disseminations of tetrahedrite, pyrite, and an unidentified yellow mineral. This shoot is 12 to 18 inches thick in the east wall of the open cut and 15 feet or more long. To the northwest it passes into a 10-inch quartz vein with a few bands of baritic rock in the hanging wall. A specimen from this vein, about half of which was composed of tetrahedrite, is reported to have assayed an ounce in gold and 225 ounces in silver. The western open cuts on this vein show a fissure zone 5 to 6 feet thick with the main lead and many narrow quartz stringers. The sulphide mineralization includes pyrrhotite, pyrite, galena, chalcopyrite, and a little tetrahedrite.

On Fish Creek No. 1 claim a mineralized quartz vein striking N. 60° W. and dipping northeast has been prospected by a series of small pits, a stripping, and two tunnels and has thus been traced for 450 feet. The country rock of the vein at the northwest is granodiorite, but for most of the length it is a brown contact-metamorphosed sedimentary rock with dikes of aplite and a light-colored facies of the granodioritic intrusive rock. The vein cuts these older dikes but itself is cut by a 75-foot dike of massive granodiorite, which is probably genetically connected with a mass of granodiorite which forms the region north of Hyder. Locally shoots mineralized with pyrite, galena, and sphalerite occur. On the bank of Fish Creek a small vein above that just described occurs in an aplite dike. It ranges from a couple of inches to 9 inches in thickness and is exposed for a vertical distance of 35 feet. It is heavily to moderately mineralized. On the bank of Fish Creek a tunnel 90 feet in length has been driven. The rock at the entrance appears to be a sheared altered rocklike aplite, but at the end of the tunnel it is a brown contact-metamorphosed slate or tuffaceous rock. An 8-foot crosscut at the end of the tunnel exposes a gently dipping stringer of quartz 4 to 6 inches thick containing a shoot mineralized with native gold.

MOLYBDENITE ON LEMESURIER ISLAND

Lemesurier Island lies in Cross Sound near the entrance to Glacier Bay. Two patented claims, the Christmas and Enterprise lodes, held by George H. Whitney, of Juneau, are located near the center of the headland between Iceberg and Willoughby coves, on

the south side of the island. The developments consist of a 78-foot tunnel and a 25-foot crosscut, about 50 feet above sea level.

A landslide has exposed at the contact zone between the diorite and the limestone about 30 feet of massive "contact" rock with associated banded hornstone. The "contact" rock consists predominantly of red-brown garnet, but some green pyroxene is associated with it. The tunnel starts at a point on the contact between the limestone and the garnet rock. The last 25 feet of the tunnel is in banded hornstone and quartzitic beds. At the breast of the crosscut diorite is exposed. Several pockets of garnet rock are exposed along the walls of the tunnel, but the best exposures are at the surface. Molybdenite occurs as facings along small gash fractures in the contact rock and to a lesser extent in disseminated form. In most of the rock the molybdenite is sparse, but small pockets are found in which molybdenite forms several per cent of the rock.

Mr. J. P. Ibach states that on the southwest headland of Willoughby Cove there are small vein stringers with variable metallization in the limestone. The stringers consist of quartz with garnet and molybdenite; epidote with bornite along fractures; pyroxene with molybdenite; and quartz heavily metallized with chalcopyrite.

FRANCIS ISLAND, GLACIER BAY

Two claims have been staked on Francis Island, in Glacier Bay, by M. V. Manville and T. P. Smith. These claims lie along a dike of diorite which cuts across the island from the southwest end to the north end. The island is composed of marble. At the southwest end the dike is about 50 yards wide and is bordered by 5 feet or so of green contact garnet rock. A few lenses of serpentine and veins of tremolite occur in the adjacent marble. Near the southwest end of the dike, on the west side, at the top of a cliff, a small pocket of bornite yielding gold and silver assays was found in the contact garnet rock. The dike at the north end is impregnated with pyrite and pyrrhotite.

DALTON HOT SPRINGS

In 1923 a group of hot springs was discovered on Baker Island in the Ketchikan district by Maxfield Dalton, of Klawak. The writer is indebted to Mr. Dalton for guidance to the locality. The springs are on the east side of the cove at the south end of Veta Bay, on the west coast of Baker Island (fig. 1). They are in a narrow niche in the coast, about 50 yards across, which trends due east and lies a little north of a position in line with two rocks off the west headland of the cove. This niche is also just north of the

place where there is a slight change in the direction of the shore line and is on the south side of the scar of an old overgrown landslide. It is in a relatively exposed position, and a landing can not be made if a heavy swell is rolling. It can be reached, however, by walking, with some difficulty, along the beach from the head of the cove.

Several small springs issue from cracks in the face of the cliff 25 feet or so above the base. Another hot spring rises in the next

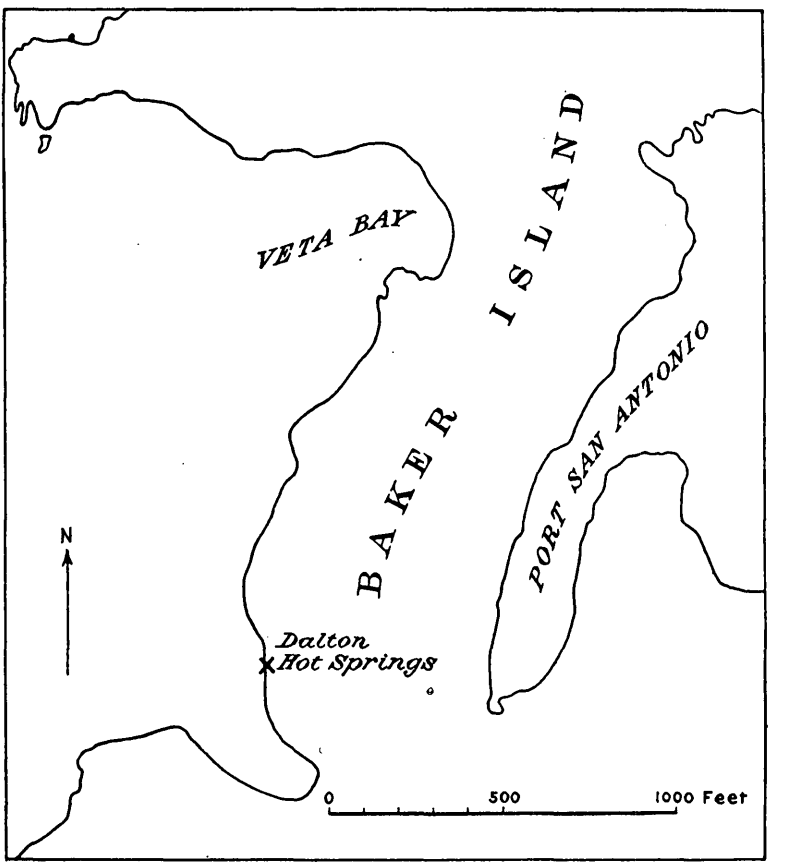


FIGURE 1.—Map showing location of Dalton Hot Springs, on west coast of Baker Island

gulch to the north. This spring was flooded with water from recent rains at the time of the writer's visit.

The country rock is quartzose diorite near a contact with sediments. Many fissure zones occur in the diorite, and the springs issue from cracks in the diorite. It was raining at the time of examination, and there had been a heavy precipitation for several days. The springs may therefore have been somewhat diluted and cooled with rain water. Their temperature was about 110° F. The accompanying table gives a chemical analysis of a sample of the water.

Analysis of water from Dalton Hot Springs, Baker Island, Alaska, collected August 18, 1924

Silica (SiO_2)	57
Iron (Fe)	.02
Calcium (Ca)	3.9
Magnesium (Mg)	1.5
Sodium and potassium (Na+K)	30
Carbonate radicle (CO_3)	16
Bicarbonate radicle (HCO_3)	24
Sulphate radicle (SO_4)	20
Chloride radicle (Cl)	8.4
Nitrate radicle (NO_3)	0
Total dissolved solids at 180° C	156
Total hardness as $CaCO_3$ (calculated)	16

The composition of the water as shown by this analysis is very similar to that of the Baranof Hot Springs,[12] on the east side of Baranof Island, or the hot springs near Fish Bay, at the north end of Baranof Island. The water is of a sodium carbonate type with relatively high silica. The mineral content of the Dalton Hot Springs is relatively low, but this may be due in part to dilution from the heavy rain which had been falling for several days before the sample was collected. A pocket of siliceous tufa has been deposited where the springs issue from the cracks in the diorite.

The temperature of the Dalton Hot Springs (110° F.) is similar to that of the Baranof Hot Springs (118° F.), the Fish Bay Hot Springs (117° F.), and the Tenakee Hot Springs (106° F.).

The springs would be accessible to the people of the towns of Craig, Klawak, and Hydaberg if a trail were cut from the head of the south arm of Port San Antonio, a distance of about 1½ miles.

LIMESTONE AND MARBLE

With the development of a pulp and paper industry in southeastern Alaska, there will probably come a demand for limestone for use in the manufacturing processes. Possibly other uses also may create a demand for it.

A general summary of the occurrence of marble has been given by E. F. Burchard,[13] but he makes only incidental references to the many available areas of limestone in southeastern Alaska. Some of these limestone areas are described here, as well as several occurrences of marble on the mainland.

The largest areas and thickest beds of uniformly pure, very high calcite limestone occur in the islands off the west coast and at the north end of Prince of Wales Island and are of Silurian age.

[12] Waring, G. A., Mineral springs of Alaska: U. S. Geol. Survey Water-Supply Paper 418, pp. 26–27, 32, 1917.

[13] Burchard, E. F., Marble resources of southeastern Alaska: U. S. Geol. Survey Bull. 682, 1920.

Silurian limestone forms many of the islands in the Kashevarof group in Clarence Straits. On the north end of Prince of Wales Islands it forms the marble beds at Calder and El Capitan, in Dry Pass, and in the northwestern part of the Mount Calder range it extends northwest from Calder Bay to Labouchere Bay and along the shore north of the Barrier Islands. Other areas are on the east side of Port Protection; along several miles of coast 1½ miles east of Point Baker; on the coast in the vicinity of Red Bay nearly as far east as Point Colpoys; and on El Capitan Passage in a belt north of Sarheen Cove and west of Aneskett Point. The largest area in which this limestone is exposed lies in the vicinity of Davidson Inlet and Sea Otter Sound and includes most of Kosciusko, Marble, Orr, Tuxekan, Eagle, White Cliff, Owl, Hoot, and Heceta islands, the east side of Tuxekan Passage in the vicinity of Tuxekan, and the southern part of Stanley Island. The limestone is exposed also on Dall Island and forms a belt that strikes northwest from Breezy Bay to the Diver Islands and from View Cove to Sea Otter Harbor. It forms Beauclerc Peak on Kuiu Island and is exposed on the passage south of Edwards Island. A fine belt of limestone forms the range of mountains along the southwest side of Saginaw Bay, on Kuiu Island. On Chichagof Island limestone is found at Basket Bay, Tenakee Inlet, and Freshwater Bay. In Glacier Bay a great range of coarsely crystalline limestone of late Silurian age runs through Willoughby and Drake islands and the east side of Rendu Inlet.

The Silurian limestones are in part of a dense texture and massive, in few places, if anywhere, showing any evidence of bedding, and in part interbedded massive limestone, thin-layered limestone, nodular and shaly limestones, calcareous shaly argillite, green-gray shale, and sparse buff-weathering sandstone. The massive limestone occurs in uniform beds as much as 2,000 feet thick. The fresh rock is white, but the usual weathered surface color is a pallid brown. The rock is usually intensely fractured, and the fracture surfaces are coated with a thin facing of calcite or rarely dolomite, which in many places weathers out in relief as a network of veinlets. Conglomerate beds are commonly associated with the thin-layered zones. Where the limestones are intruded by igneous rocks they are recrystallized and form fine to coarsely crystalline limestone, some of which afford fine marble, as at Tokeen, on Marble Island, and Calder and El Capitan, on Dry Pass, Prince of Wales Island. The Silurian limestones of Glacier Bay and Chichagof Island are likewise recrystallized by the contact-metamorphic action of intrusive igneous masses.

The Silurian limestones are prevailingly high-calcite limestones, carrying from 95 to 99 per cent of calcium carbonate. Of the 10 analyses given in the table on page 61, 7 show about 96 per cent

or more of calcium carbonate. It is certain that large quantities of very high grade calcite limestone are available in this formation.

Limestones of pre-Silurian age in beds from 100 to several hundred or even a thousand feet thick, together with a great many thinner ones, occur within a series of schists and greenstones in the vicinity of Sulzer and Copper Mountain and at the head of Cholmondeley Sound, on Prince of Wales Island. They also form the east side of Long Island, in Cordova Bay, and a belt that strikes southeast through Howkan and northwest to Waterfall Bay, though the rocks in this belt may not be of pre-Silurian age but may represent the high-calcite beds of the Silurian system. The limestone ranges from a white, coarsely crystalline marble to a dark-blue to nearly black, in places finely crystalline to granular though locally thin-bedded and slaty limestone. Only two analyses of these limestones are available. One represents a very high calcite limestone (No. 19) and the other a pure magnesian or dolomitic limestone (No. 20).

Limestones of Devonian age in beds as much as 600 feet thick are exposed on Long and Round islands in Kasaan Bay, Prince of Wales Island, and on the islands in San Alberto Bay opposite Klawak. On Kupreanof Island they are found at the head of Duncan Canal, along the center and west arms, and at the head and along the east side of Emily Island Arm. No chemical analyses of these limestones are available. Some of the limestones on San Alberto Bay seem to be fairly pure, and all are worthy of investigation if their geographic location should make it desirable.

Limestones of Permian age form much of the Keku group of islands and the adjacent shore of Kuiu Island. They also form the line of conspicuous bluffs along the northeast side of Saginaw Bay on Kuiu Island. They are also found in a narrow belt on the mainland in the Juneau district, outcropping along the shore at Point Anmer, at the entrance to Port Snettisham, and striking inland to the southeast. Permian limestones are also exposed in Pybus and Gambier bays, on Admiralty Island. The Permian limestones (about 1,000 feet thick) usually have intercalated layers of chert. Locally, however, thick clean beds are present. On the island opposite the cannery on the east side of Saginaw Bay, Kuiu Island, there is a steep, high bluff of clean limestone. Analysis No. 13, which represents a typical specimen, shows the rock to be a high-calcite limestone.

Limestones of Triassic age crop out east of Point Cornwallis, on Kuiu Island, and probably form much of the peninsula inland. Analysis No. 14, which represents the composition of a specimen from a locality about 3 miles southwest of Point Cornwallis, on Keku Straits, shows the rock to be an impure calcite limestone con-

taining about 11 per cent insoluble matter. Upper Triassic limestones are exposed on the islands in Hamilton Bay, Kupreanof Island; on the Screen Islands, in Clarence Straits; on the west side of Gravina Island; and in Pybus and Gambier bays, Admiralty Island. These limestones are usually medium to thin bedded and commonly have intercalated layers of black slate. They are probably predominantly impure argillaceous and siliceous calcite limestones.

Analyses of limestones from southeastern Alaska

	Locality	Calcium carbonate ($CaCO_3$)	Magnesium carbonate ($MgCO_3$)	Insoluble
	BEDS OF SILURIAN AGE			
1	White marble, Tokeen, Marble Island, Ketchikan district	99.51	0.94	0.01
2	Veined marble, Tokeen, Marble Island, Ketchikan district	81.90	14.93	.20
3	Dark-veined marble, Orr Island, Ketchikan district	95.90	1.40	3.50
4	Mottled dark marble, Orr Island, Ketchikan district	95.35	2.04	2.95
5	Limestone, north side Heceta Island, Ketchikan district	84.46	13.18	13.18
6	Limestone, southwest end Orr Island, Ketchikan district	98.99	1.01	.12
7	Limestone, north side Heceta Island, Ketchikan district	99.12	.63	.37
8	Marble, head of Red Bay, Prince of Wales Island	96.90	2.59	1.70
9	Marble, Marble Creek, north of Shakan, Prince of Wales Island	99.26	.63	Trace.
10	Mottled marble, south of Sandy Cove, Glacier Bay	96.16	.89	2.56
	BEDS OF MISCELLANEOUS AGE			
11	Marble, Dickman Bay, Prince of Wales Island	74.61	3.25	22.84
12	Dark-green marble, Dickman Bay, Prince of Wales Island	58.40	6.61	37.32
13	Bluff of Permian limestone at southwest end of island opposite the cannery on the east side of Saginaw Bay, Kuiu Island	96.82	.63	2.79
14	Triassic limestone, about 3 miles southwest of Point Cornwallis on Keku Straits, Kuiu Island	87.19	.84	11.32
15	Talcose marble, Lake Virginia, mainland, east of Wrangell	53.69	26.10	19.06
16	Graphite marble, Basket Bay, Chichagof Island	63.68	8.90	28.19
17	White marble, north side of Marble Cove, Admiralty Island	61.11	39.10	.91
18	White marble, south of Marble Cove, Admiralty Island	95.44	1.45	3.61
19	Marble, near Waterfall Bay, Dall Island	99.59	1.03	.32
20	Limestone, near Jumbo mine, Copper Mountain region, Prince of Wales Island	82.75	15.62	1.84

Analyses 1–5, 8, 10–12, and 15–19 made by R. K. Bailey for E. F. Burchard; 6, 7, 13, and 14 by J. G. Fairchild for A. F. Buddington; 9 by E. F. Lass for the Alaska Marble Co.; 20 by George Steiger for C. W. Wright.

Beds of clean, sound marble are found at several places on the mainland, but the grain is usually medium to coarse, and some of the rock is inaccessible. The clean beds are associated with or intercalated between beds that carry silicate material disseminated or in pockets or veins. Narrow beds of fine-grained marble occur locally, and some very fine specimens occur in the terminal moraine of the North Dawes Glacier, at the head of Endicott Arm.

On the mainland, about 3 miles east of the landslides on Thomas Bay, marble forms a conspicuous mountain peak and probably a belt that extends almost to the valley of Scenery Cove, for many boulders are found in the bed of the stream draining into that arm of the bay.

Two brooks enter at the head of the west arm of Fords Terror. Beds of limestone are exposed in the bed of the eastern brook at an altitude of about 500 feet. A knoll about 1,000 feet high, just

visible from the head of the arm, consists predominantly of marble that weathers to a buff color. The beds strike about N. 60° W. and can be plainly seen to strike into the mountains to the southeast and northwest. The marble occurs in part in thick beds and is prevalently coarse grained. Thin seams with disseminated fine scaly phlogopite and grains of yellow chondrodite are common. Locally minute crystals of lavender-colored spinel are associated with them. Beds and thin layers of dark biotite schist and injection gneiss are intercalated in the marble. Boulders of marble several feet in diameter litter the bed of the brook all the way to the shore.

About 8 miles from the head of Tracy Arm, on the south side, Eugene Owens has staked claims on coarse-grained marble. Just east of the mouth of a large brook a bed of marble about 25 yards wide is exposed between injection gneiss and nonbedded schistose rock that weathers yellowish brown. The marble is quite clear in the central portion but is banded with quartz veinings on the edges.

The widest, clearest bed of marble seen by the writer is that which forms the mountain at the Whiting River silver prospect, about 7½ miles a little north of east of Whiting Point. Bands containing disseminated chondrodite and tremolite were noted, but much of the rock appears to be pure. Several specimens taken here consist of medium-grained dolomite, and one of coarse-grained calcite marble. The dolomite appears to be the predominant rock.

A belt of marble much disrupted and brecciated by quartz diorite is found at Bride Point, on the north arm of Port Snettisham.

At the extreme head of Saginaw Bay, on the southwest side, dikes of diorite occur in limestone. The limestones strike inland to the southeast. If the dikes at the shore are offshoots from a larger intrusive mass lying inland there would be a chance of finding marble at the contact. The actual conditions are not known.