Mineral Resources of Alaska 1945-46

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ILLUSTRATIONS

MINERAL RESOURCES OF ALASKA 1945–46

SOME MINERAL INVESTIGATIONS IN SOUTHEASTERN ALASKA

By W. S. Twenhofel, J. C. Reed, and G. O. Gates

ABSTRACT

About a dozen mines, principally gold mines, were operating in southeastern Alaska in 1940, but by 1944 the Riverside tungsten mine in the Hyder district was the only active mine in the region except for a little mining and prospecting by a few groups of a few men each. During the same interval the exploration for and appraisal of mineral deposits in southeastern Alaska by the Geological Survey and the Bureau of Mines was greatly increased, and many of the examinations were of deposits of the strategic and critical minerals.

In 1940 and 1941 the Geological Survey made a detailed investigation of the nickel-copper deposits on Yakobi Island, and in 1941 the chromite deposits at Red Bluff Bay on Baranof Island and the nickel-copper deposits on the west Coast of Chichagof Island were studied. Late in 1941 the Bureau of Mines started a sampling and drilling project on the Yakobi Island deposits and completed it in 1942 and later in 1942 also tested the deposits on Chichagof Island. In the summer of 1942 the Geological Survey examined tungsten deposits in the Hyder district, and the deposits were drilled and sampled by the Bureau of Mines in 1942 and 1943. The Geological Survey in 1942 studied molybdenite deposits in Glacier Bay and started a systematic investigation of the iron-copper deposits of Prince of Wales Island. The molybdenite deposits and some of the iron-copper deposits were later drilled and sampled by the Bureau of Mines. Some of the zinc deposits of southeastern Alaska and an antimony deposit on the Cleveland Peninsula were investigated by the Geological Survey in 1942, and a start was made on a study of the copper-palladium deposit at the Salt Chuck mine.

In 1943 the Geological Survey continued its studies of the iron-copper deposits of Prince of Wales Island and completed the project at the Salt Chuck mine. The zinc investigations were expanded in 1943. In addition some ultrabasic rocks were explored for nickel, chromium, and refractory grade olivine, and two molybdenite deposits were examined. In 1944 the Survey continued its investigations of the iron-copper and zinc deposits.

The results of much of the Geological Survey work outlined above have appeared in bulletins or in mimeographed reports. However, some of the studies, especially brief examinations made largely for planning purposes, have not hitherto been prepared for public distribution. In this report are recorded for the first time the results of many of these investigations. The report includes information gathered in 1939 through 1944 and contains descriptions of six copper deposits or groups of deposits; three gold deposits; and one deposit of each

of the following: Copper-lead, lead, barite, tungsten, iron, gypsum, asbestos, and witherite.

INTRODUCTION

For a considerable number of years the Geological Survey, because of limited funds and personnel, has not been able to continue its former practice of publishing a yearly résumé of mineral investigations in southeastern Alaska. However, for the years from 1904 through 1942 the Geological Survey issued an annual summary of the statistics of production of Alaskan mines,[1] and most of the important mining activities in southeastern Alaska have been briefly recorded in those summaries. This report records in more detail some of the mineral investigations in southeastern Alaska for the period from 1939 to 1944, inclusive.

In the interval 1940–44 two major changes took place in the mineral industry of southeastern Alaska. All mining virtually ceased, and the activities of the Federal Government in the exploration for and of mineral deposits were greatly expanded. Both changes were brought about directly as a consequence of the war.

At the beginning of the period nearly a dozen mines, most of them gold mines, were in operation. During 1940 and 1941 the mining companies were beginning to be affected by the manpower shortage and the difficulties of obtaining supplies and equipment. The lure of higher wages paid on many of the large construction projects in Alaska and nearby Canada took many of the miners and laborers from the mines throughout Alaska. Gold mining was drastically curtailed late in 1942 by an order of the War Production Board which declared that gold mining was not an essential industry. Priorities were refused all mines except those that were specifically exempt because they produced strategic materials; as a consequence, by 1943 only two or three mines were operating in southeastern Alaska. In 1944 the Alaska Juneau Gold Mining Co. closed its mine at Juneau, and by the end of 1944 the Riverside tungsten mine in the Hyder district was reported to be the only active mine in southeastern Alaska. However, some mining and prospecting was carried on in 1944 by groups of a few men.

MINERAL ACTIVITIES OF THE FEDERAL GOVERNMENT IN SOUTHEASTERN ALASKA

INVESTIGATIONS IN 1940 AND 1941

By 1940 nickel was considered one of the so-called strategic metals, and the Geological Survey made a detailed investigation of the large nickel-copper deposits on Yakobi Island.[2]

[1] See U. S. Geol. Survey bulletins entitled, Mineral industry of Alaska.

[2] Reed, J. C., and Dorr, J. V. N., 2d, Nickel deposits of Bohemia Basin and vicinity, Yakobi Island, Alaska: U. S. Geol. Survey Bull. 931–F, pp. 105–138, 1942.

In 1941 a Geological Survey party, consisting of P. W. Guild and J. R. Balsley, investigated in detail the chromite deposits at Red Bluff Bay and vicinity, Baranof Island,[3] and another field party, under W. T. Pecora, mapped the nickel-copper deposits on the west coast of Chichagof Island.[4] During the same summer a Geological Survey party consisting of J. C. Reed and G. O. Gates briefly examined a number of deposits of strategic minerals in southeastern Alaska to appraise the deposits as sources of vitally needed materials and to determine the desirability of further geologic work on them.

INVESTIGATIONS IN 1942

Late in 1941 the Bureau of Mines started a project of sampling and diamond-drilling the nickel deposits on Yakobi Island. The project was shut down in the winter of 1941–42 because of weather conditions but was completed in the following summer.[5]

In 1942 the field activities of the Geological Survey were enlarged as a consequence of the expanded demand for minerals caused by the entry of the United States into the war. In the Hyder district F. M. Byers, Jr., and Clyde Wahrhaftig examined in detail the Riverside mine and the Mountain View prospect, both of which contain significant amounts of scheelite. Many other mineral deposits in the Hyder district also were examined for tungsten ore.[6] In the winter of 1942–43 the Bureau of Mines diamond-drilled and sampled the Riverside mine.

The Geological Survey continued its investigations of the nickel-copper deposits on Yakobi Island in connection with the Bureau of Mines program of diamond-drilling. G. O. Gates, of the Geological Survey, was first assigned to this project, and later G. C. Kennedy continued the work and mapped and examined the rest of Yakobi Island.[7] After completion of the work on Yakobi Island the Bureau of Mines sampled and diamond-drilled some of the nickel-copper deposits on the west coast of Chichagof Island.[8] G. C. Kennedy also further studied the deposits on Chichagof Island at that time.[9]

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[3] Guild, P. W., and Balsley, J. R., Jr., Chromite deposits of Red Bluff Bay and vicinity, Baranof Island, Alaska: U. S. Geol. Survey Bull. 936–G, pp. 171–187, 1942.

[4] Pecora, W. T. Nickel-copper deposits on the west coast of Chichagof Island, Alaska: U. S. Geol. Survey Bull. 936–I, pp. 221–243, 1942.

[5] Bureau of Mines, Yakobi Island, Sitka mining district, Alaska: War Minerals Rept. 174, 1944.

[6] Byers, F. M., Jr., Tungsten deposits of the Hyder district, southeastern Alaska: U. S. Geol. Survey preliminary report (mimeographed), 1945.

[7] Kennedy, G. C., and Walton, M. S., Jr., Nickel investigations in southeastern Alaska: U. S. Geol. Survey Bull. 947–C, pp. 41–56, 1946.

[8] Bureau of Mines, Mirror Harbor, Chichagof Island, Alaska: War Minerals Rept. 333, 1944.

[9] Kennedy, G. C., and Walton, M. S., Jr., op. cit. (Bull. 947–C).

In 1942 a Geological Survey field party consisting of W. S. Twenhofel and D. M. Hopkins examined the large low-grade molybdenum deposit near the head of Muir Inlet, in Glacier Bay.[10] The Bureau of Mines later in the summer extensively sampled the deposit and diamond-drilled two holes.[11]

In 1942 the Geological Survey started a long-range program of investigation of most of the iron deposits of southeastern Alaska. For a number of years there has been considerable interest in the possibility of greater industrialization of the Pacific Northwest. As any such development takes place it is thought that some of the iron ore that may be needed can be obtained from southeastern Alaska. In the past many statements of the iron-ore possibilities of southeastern Alaska have been made, but prior to the recent investigations little was known about the actual tonnage and grade of iron ore available. The largest known iron deposits in southeastern Alaska are in the vicinity of the old Mount Andrew and Mamie mines on the Kasaan Peninsula, Prince of Wales Island. This area was studied in 1942 by E. N. Goddard, L. A. Warner, and M. S. Walton, Jr.[12] After completion of studies of the Mount Andrew-Mamie area the same field party examined the Iron King No. 1 copper prospect [13] and the Poor Man iron deposit,[14] both of which also are on the Kasaan Peninsula.

The zinc deposits of Groundhog Basin, Wrangell district, were studied by H. R. Gault, of the Geological Survey.[15] This work was the start of a program to investigate the geology and zinc resources of the several known zinc deposits on the west flank of the Coast Ranges of southeastern Alaska. Late in 1942 Ventures Ltd. of Canada conducted explorations at the Groundhog Basin deposits. The company suspended operations after it had drilled two holes and had taken underground and surface samples. According to reports, the company ceased operations because of monetary difficulties attendant upon a Canadian company's activities in the United States.

[10] Twenhofel, W. S., Robinson, G. D., and Gault, H. R., Molybdenite investigations in southeastern Alaska: U. S. Geol. Survey Bull. 947–B, pp. 9–18, 1946.

[11] Bureau of Mines, Molybdenum deposits, Muir Inlet, Alaska: War Minerals Rept. 40, 1943. Muir Inlet or Nunatak molybdenum deposits, Glacier Bay, southeastern Alaska: War Minerals Rept. 300, 1943.

[12] Goddard, E. N., Warner, L. A., and Walton, M. S., Jr., Copper-bearing iron deposits of the Mount Andrew-Mamie area, Kasaan Peninsula, Prince of Wales Island, southeastern Alaska, U. S. Geol. Survey preliminary report (mimeographed), 1944.

[13] Warner, L. A., and Walton, M. S., Jr., The Iron King No. 1 copper prospect, Kasaan Peninsula, Prince of Wales Island, southeastern Alaska, U. S. Geol. Survey preliminary report (mimeographed), 1944.

[14] Warner, L. A., and Walton, M. S., Jr., The Poor Man iron deposit, Kasaan Peninsula, Prince of Wales Island, southeastern Alaska, U. S. Geol. Survey preliminary report (mimeographed), 1944.

[15] Fellows, R. E., and others. Lead-zinc deposits of southeastern Alaska: U. S. Geol. Survey (in preparation).

G. D. Robinson of the Geological Survey mapped the small antimony deposits at Caamano Point, on the Cleveland Peninsula, in the summer of 1942.[16]

Late in 1942 the Geological Survey assigned H. R. Gault and Clyde Wahrhaftig to study the unique copper-palladium deposit at the Salt Chuck mine at the head of Kasaan Bay.[17] This work continued into the early part of 1943.

Also late in 1942 the Bureau of Mines started a project of diamond-drilling of the Poor Man iron deposit[18] and the Iron King No. 1 copper deposit.

INVESTIGATIONS IN 1943

In 1943 the Geological Survey continued its investigations of the iron and copper deposits on Kasaan Peninsula. The geologists assigned to this work included L. A. Warner, C. T. Bressler, R. G. Ray, S. P. Brown, and C. P. Wagner. The deposits examined included the Haida, Copper Center, Brown and Metzdorf, It, Alarm, and Venus, and the Rush and Brown mine, the Salt Chuck mine, and the Rich Hill mine.[19] At the same time the Bureau of Mines diamond-drilled and sampled the Poor Man iron deposit, the Salt Chuck mine, and part of the Rush and Brown mine.

The zinc investigations of the Geological Survey in the Coast Ranges of southeastern Alaska were continued on an expanded scale in 1943. H. R. Gault, G. M. Flint, Jr., and D. L. Rossman continued in the Glacier Basin the work that was begun the previous season in the Groundhog Basin.[20] The zinc-lead deposits at the Lake claims in the Wrangell district also were examined.[21] G. D. Robinson and R. A. Harris examined the zinc deposits at Moth Bay on Revillagigedo Island[22] and the molybdenum deposits at Shakan and on Baker Island.[23] On Baker Island the Kennecott Copper Corp. was engaged in an exploratory program of diamond-drilling.

G. C. Kennedy and M. S. Walton, Jr., studied several areas of ultrabasic rocks as possible sources of nickel, chromium, platinum, and

[16] Robinson, G. D., The Caamano Point antimony deposit, Cleveland Peninsula, southeastern Alaska: U. S. Geol. Survey preliminary report (mimeographed), 1943.

[17] Gault, H. R., The Salt Chuck copper-palladium mine, Prince of Wales Island, southeastern Alaska: U. S. Geol. Survey preliminary report (mimeographed), 1945.

[18] Bureau of Mines, Poor Man iron deposit, Kasaan Peninsula, Prince of Wales Island, southeastern Alaska: War Minerals Rept. 227, 1944.

[19] Warner, L. A., Goddard, E. N., and others, Iron and copper deposits of Kasaan Peninsula, Prince of Wales Island, southeastern Alaska, U. S. Geol. Survey (in preparation).

[20] Fellows, R. E., and others, Lead-zinc deposits of southeastern Alaska: U. S. Geol. Survey (in preparation).

[21] Idem.

[22] Idem.

[23] Twenhofel, W. S., Robinson, G. D., and Gault, H. R., Molybdenum investigations in southeastern Alaska: U. S. Geol. Survey Bull. 947–B, pp. 19–36, 1946.

refractory-grade olivine. Among the areas studied were the Blashke Islands; Kane Peak, on Kupreanof Island; Mount Burnett, on the Cleveland Peninsula; central Baranof Island; and Lituya Bay.[24] Kennedy and Walton also made a magnetometer survey of the Muskeg nickel-copper body on Yakobi Island.[25]

J. C. Reed and W. S. Twenhofel, in order to appraise the need for future geologic work, made preliminary examinations of a number of mineral deposits in southeastern Alaska in 1943.

INVESTIGATIONS IN 1944

During 1944 the activities of the Federal Government in the exploration of mineral deposits in southeastern Alaska continued on about the same scale as in the previous year. The Geological Survey continued its investigations of the iron deposits on Prince of Wales Island. L. A. Warner and Karl Stefansson mapped the geology and made magnetic maps of the Tolstoi Mountain area on Kasaan Peninsula.[26] Prior to the Survey's examination the Bureau of Mines trenched and sampled some of the deposits at Tolstoi Mountain.

C. T. Bressler, in connection with a Bureau of Mines program of trenching and diamond-drilling, further studied the iron deposits of the Mount Andrew-Mamie area on Kasaan Peninsula. At Jumbo Basin on the west coast of Prince of Wales Island, G. C. Kennedy investigated the iron deposits and studied the old Jumbo copper mine. At the same time the Bureau of Mines sampled the surface exposures of the magnetite deposits.

The Geological Survey also continued in 1944 its investigations of the zinc deposits of the Coast Ranges of southeastern Alaska. H. R. Gault and R. E. Fellows studied the geology of the east side of Holkham Bay and the zinc-copper deposits at Tracy Arm.[27]

W. S. Twenhofel and G. M. Flint, Jr., briefly examined a number of mineral deposits, some of which are described later in this report.

The Bureau of Mines in 1944 drove an exploratory drift and sampled the Mountain View tungsten deposit in the Hyder district. Late in 1944 the Bureau started an exploratory project on the nickel deposit at Funter Bay.

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[24] Kennedy, G. C., and Walton, M. S., Jr., Geology and associated mineral deposits of some ultrabasic rock bodies in southeastern Alaska: U. S. Geol. Survey Bull. 947-D, pp. 65-84, 1946.

[25] Kennedy, G. C., and Walton, M. S., Jr., Nickel investigations in southeastern Alaska: U. S. Geol. Survey Bull. 947-C, pp. 41-56, 1946.

[26] Warner, L. A., Goddard, E. N., and others, Iron and copper deposits of Kasaan Peninsula, Prince of Wales Island, southeastern Alaska: U. S. Geol. Survey (in preparation).

[27] Fellows, R. E., and others, op. cit.

DESCRIPTION OF DEPOSITS

INTRODUCTORY STATEMENT

Most of the Geological Survey's recent investigations in southeastern Alaska have been detailed and comprehensive studies of small areas or of single deposits, and the results of many of these studies are described in other Survey reports, as noted in the preceding parts of this report. In the course of the detailed work it was desirable to examine briefly many other deposits in order to plan future work. Some of these deposits warranted further study and were selected for detailed investigation in later years. A number of the deposits that did not appear to warrant further work at the time are described later in this report. Most of these descriptions are based on 1- or 2-day examinations and are necessarily brief. This report also includes descriptions of some deposits that were studied earlier but on which no reports have previously been published.

DEPOSITS ON PRINCE OF WALES ISLAND

DAMA (COPPER CLIFF) PROSPECT

The Dama prospect, also known as the Copper Cliff, is about 750 feet above sea level on the southwest side of Niblack Anchorage, about 25 miles southwest of Ketchikan. (See fig. 1.) It is midway between the entrance and the head of Niblack Anchorage and directly opposite the large island nearest the head of the bay. About 560 feet of underground workings have been excavated at the prospect. (See fig. 2.) Most of the development work was done in the years 1903–5,[28] and the property has since been idle. Several trenches and open cuts, about 200 feet above the underground workings, expose parts of the mineralized zones.

The deposit consists of several broad zones, in places as much as 125 feet thick, of pyritized schist. Parts of the mineralized zones are completely replaced by pyrite; other parts are not completely replaced. The broadest zone seen was in the underground workings. It is estimated that this zone consists of at least 50 percent of pyrite; the other minerals are quartz, mica, and some feldspar. The pyritized schist zone exposed in the workings and the schist on both sides of the zone strike N. 45° W. and dip approximately 70° S. W.

The mineralized zones were prospected for their copper content, but a crude sample, collected by taking chips at 5-foot intervals across the 125-foot zone, was analyzed by W. G. Schlecht, of the Chemical Laboratory of the Geological Survey, and found to contain only 0.11 per-

[28] Wright, F. E. and C. W., The Ketchikan and Wrangell mining districts, Alaska: U. S. Geol. Survey Bull. 347, p. 131, 1908.

cent of copper. The ore bodies at the old Niblack copper mine at the head of Niblack Anchorage were similar to the pyritized zones at the Dama prospect except that they were smaller and contained considerably more copper.

SHELTON PROSPECT

The Shelton prospect is on the east side of Twelvemile Arm about 6 miles from its head. (See fig. 1.) An old and obscure blazed trail

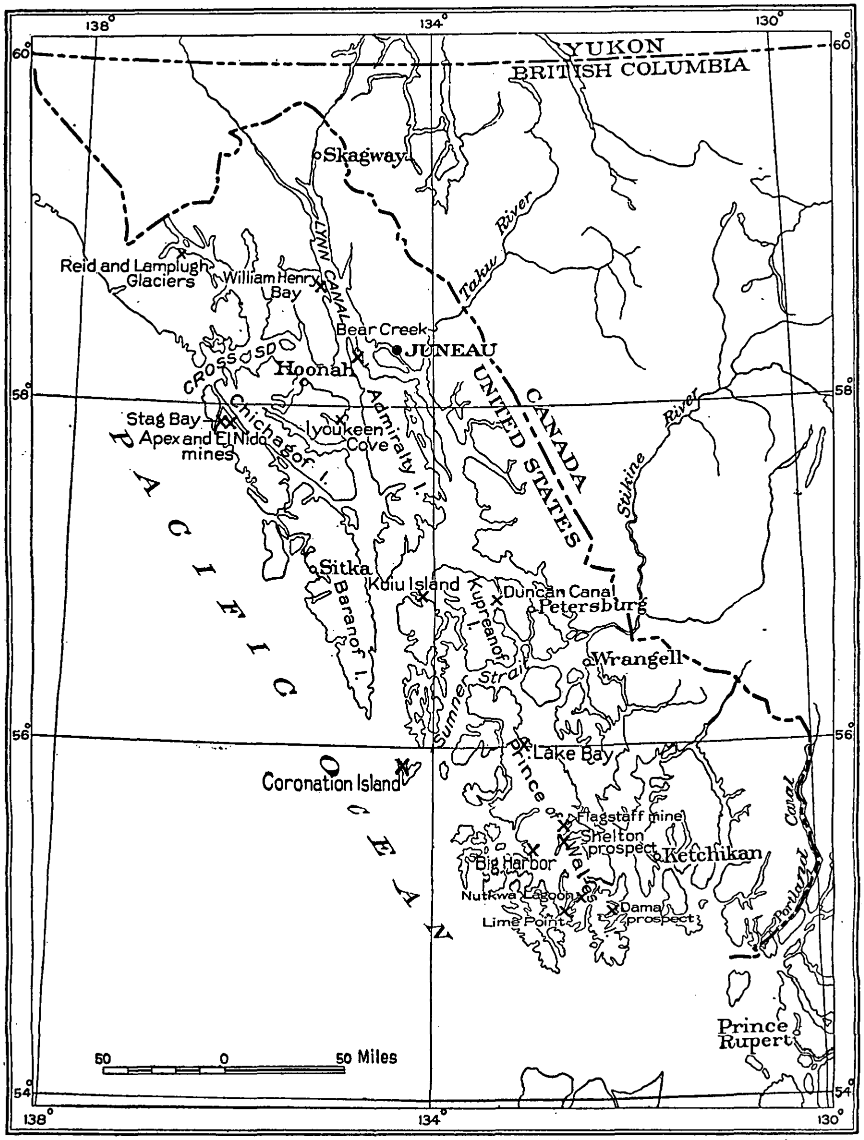

FIGURE 1.—Index may of southeastern Alaska, showing location of deposits described in this report.

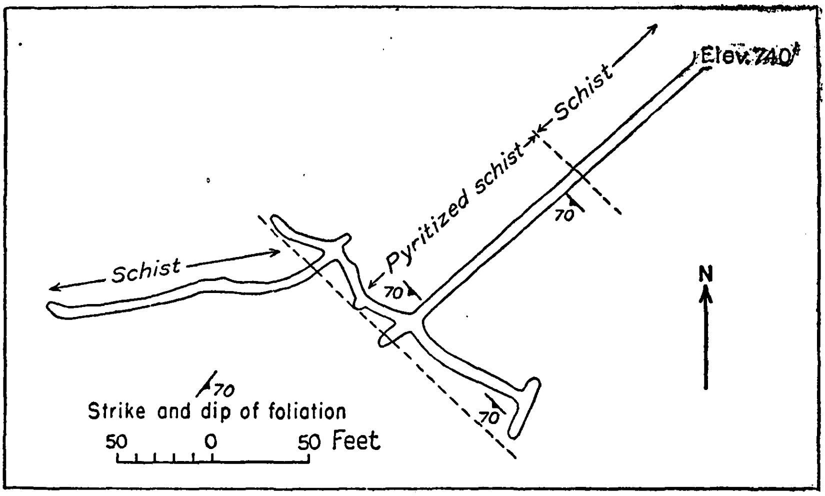

FIGURE 2.—Sketch map of underground workings at the Dama (Copper Cliff) prospect, Niblack Anchorage.

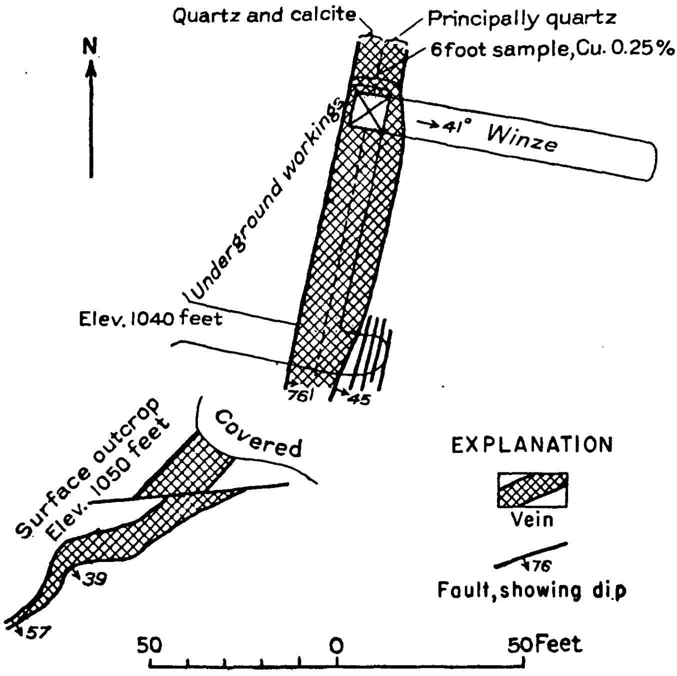

FIGURE 3.—Sketch map of Shelton vein, Twelvemile Arm.

leads from a small bight to the prospect, about 1,000 feet above sea level. The prospect consists of a vein that crops out in the bed of a small stream. It has been prospected by a short drift and a 55-foot winze. (See fig. 3.) The development work was done prior to 1905,[29] and the property has since been idle.

The gangue minerals are quartz and calcite; calcite is abundant near the footwall but is rare near the hanging wall. The only ore minerals in the vein are pyrite and chalcopyrite. The sulfide minerals are principally associated with quartz in and near wall-rock inclusions in the vein. Sulfide minerals are not abundant and probably do not average more than 1 or 2 percent of the vein material. A 6-foot sample taken across the vein near the head of the winze was analyzed by W. G. Schlecht, of the Chemical Laboratory of the Geological Survey, and found to contain 0.25 percent of copper.

FLAGSTAFF MINE

The Flagstaff gold mine is on the northeast slope of Granite Mountain, 4 miles southwest of Karta Bay, a small indentation at the head of Kasaan Bay. Karta Bay is about 42 miles by water northwest of Ketchikan (fig. 1).

From tidewater on Karta Bay, a truck road leads 1½ miles to Little Salmon Lake (also known as Karta Lake). Transportation across the lake was formerly furnished by a log raft powered by an automobile engine, but the raft is now in disrepair. A rough truck road leads from the ferry landing 3 miles up the valley of Granite Creek to the camp and mill of the Flagstaff mine. The buildings are at an altitude of 510 feet, but the main portal of the mine is at an altitude of about 1,400 feet on the steep and heavily timbered mountainside above the mill.

HISTORY AND DEVELOPMENT

The following history of the Flagstaff mine has been assembled from publications of the Geological Survey and from oral reports from various sources.

The claims which the property now comprises include some that were staked prior to 1905 as the Treasure group. Development up to that year consisted of two tunnels, one 50 feet long and the other 400 feet long, corresponding, respectively, to the present lowest adit and the main adit.[30] In 1912 the claims were restaked as the Last Chance group, and by 1915 another 50-foot adit had been driven at an elevation of 2,400 feet.[31] This adit was not seen during the

[29] Wright, F. E. and C. W., op. cit. (Bull. 347), p. 128.

[30] Wright, F. E. and C. W. Lode mining in southeastern Alaska: U. S. Geol. Survey Bull. 284, pp. 41–42, 1906.

[31] Chapin, Theodore, Mining developments in southeastern Alaska: U. S. Geol. Survey Bull. 642–B, p. 80, 1916.

investigations for this report. No further record has been found of the development of the claims until 1935, when Tom Stevens and associates reported a small amount of production. The main adit was driven 80 feet farther during that year. In August 1937 the Flagstaff Mining Co. was formed with W. M. Goodwin as president. Systematic development was undertaken shortly thereafter. The mine closed in 1941 and has not been operated since. It is said that the mine was forced to close because a large part of the gold was not recovered by the milling methods used.

The Flagstaff mine was examined briefly by J. C. Reed and J. V. N. Dorr 2d, of the Geological Survey, early in May 1940. The main level was mapped by Dorr, and a reconnaissance of the surface geology was made by Reed, accompanied by W. M. Goodwin.

At the time of the investigation, development of the property consisted of a main level 1,120 feet long, a 55-foot winze, and five small stopes. Buildings and equipment on the property included a 20-ton mill, an 1,800-foot aerial tram with half-ton counterbalanced buckets, a compressor, an assay office, a staff house, mess hall, two bunkhouses, and other smaller structures. The owners have had a watchman at the property since the mine closed, and most of the equipment and buildings are still in fair condition.

GEOLOGY

The country rock in the area is part of a large stock, probably of Cretaceous age, which is closely related to the Coast Range batholith of the mainland. In the immediate vicinity of the mine the rock is diorite and gabbro, which, according to the Wrights,[32] contain much secondary epidote and hornblende.

The Flagstaff vein is traceable on the surface for more than a mile and through a vertical range of at least 1,300 feet. It strikes about N. 55° W. and dips 60° to 86° NE. In the mine the vein follows the footwall of a dike, the thickness of which is nowhere measurable but which, judging entirely from inadequate surface indications, is probably not more than 8 feet.

Three hundred feet above the main level a small cross fault intersects the vein. No offset in either structure was observed. The cross fault contains 6 inches of quartz for a distance of 6 or 8 feet from the vein. Good ore crops out in the main vein about 35 feet below the intersection.

A second cross fault, which also contains quartz and which strikes N. 18° E. and dips 26° W., intersects the Flagstaff vein about 450 feet above the main level. The intersection is covered by talus so that the relation of the two veins is obscured.

[32] Wright, F. E. and C. W., op. cit. (Bull. 284), p. 42.

Six hundred feet above the main level the vein is 4 feet wide and very well mineralized.

A third cross fault, marked by a quartz vein 2 feet wide, intersects the Flagstaff vein at an altitude of about 2,500 feet. Northwest of this intersection the Flagstaff vein is said by the operators to be lean and discontinuous. An old adit, approximately 160 feet long, in the well-mineralized quartz of the cross vein lies about 100 feet above and several hundred feet north of the intersection. An old arrastre nearby indicates that this may be the adit that was driven in 1915.

The Flagstaff vein as exposed in the main adit of the mine ranges in width from less than an inch to a little more than 36 inches and averages about 18 inches. Variation in width along the strike is commonly abrupt. (See pl. 1.) The vein forms the footwall of a diabase dike of unknown thickness. A zone of gouge between the vein and the dike indicate faulting, and horizontal and nearly horizontal slickensides in the quartz show that at least the latest movement was later than the quartz. The footwall of the vein is marked by a second dike ranging from 1 inch to more than 30 inches in width; the average width is between 3 and 6 inches. The widths of the vein and of the footwall dike appear to range independently. The dike does not everywhere follow the vein but at some places splits off into the country rock in an irregular manner, thereby causing the vein to lie against a footwall of the diorite that composes the country rock. (See pl. 1.)

Microscopic examination of a relatively unaltered specimen of the hanging-wall dike, taken about 3 feet from the vein, proved it to be diabase. Other specimens show that this dike is greatly altered close to the vein; the principal constituents are chlorite, calcite, and a brown clay mineral that is apparently secondary after original augite. A few remnants of plagioclase are present. The complete absence of silicification is interesting.

The footwall dike has been altered so completely that none of the original minerals is identifiable although a relict diabasic texture is preserved. Originally this dike also was probably diabase, although finer grained than the hanging-wall dike. There is no silicification. Neither dike has been crushed, but the footwall dike is very sparsely veined by chlorite, calcite, and quartz.

The vein is composed of white locally vuggy quartz with locally abundant sulfide minerals, which in many places are banded parallel to the vein walls. Thin sections reveal both medium-grained and fine-grained quartz, possibly of two generations, which show no strain and only slight crushing. The ore minerals include galena, chalcopyrite, pyrite, sphalerite, covellite, and a little sooty chalcocite. Native copper was reported by H. G. Wilcox.[33] The covellite and chalcocite may be

[33] Personal communication.

secondary. Hydrous oxides of iron were noted but are not particularly common and seem no more abundant at the outcrop than several hundred feet underground. The operators believe that the poor mill recovery of gold is due to the oxidized nature of the ore, but this explanation does not seem entirely adequate.

It is not known with which minerals the gold and silver are associated. The record of production in 1939 shows that, by the milling methods then in use, less than 1 percent of the gold was recovered by amalgamation and that the silver-gold ratio of the ore by weight is about 7 to 1. According to the same record, 10.5 pounds of copper and 1.6 pounds of lead were produced for each ounce of gold. The value of the ore is reported by the operators to average about $12 per ton, but recovery as indicated by production returns is appreciably less.

The distribution of the sulfide minerals within the vein follows no regular pattern other than the rude banding parallel to the walls. Between a point about 500 feet from the portal and the cross fault about 210 feet from the face, values are higher than the average of the mine as a whole and some stoping has been done. The vein is leaner beyond the cross fault and, close to the face, is composed largely of calcite. The operators of the mine report that a raise has shown that the ore is limited upward by this cross fault, which displaces the vein 18 inches. The bottom of a 50-foot winze near the fault is in ore.

It has been reported that this fault is the same as the one found at the surface 300 feet above the adit, but this is not possible unless the dip changes markedly between the exposures in the adit and at the surface. The surface geology indicates a system of fractures with low westerly dips that is younger than the fracture in which the Flagstaff vein is emplaced, and younger, in part at least, than the vein itself.

The operators state that within the mine commercial ore seems to be limited northward by the cross fault. Specimens collected from the Flagstaff vein several hundred feet above and north of the projected trace of the fault contain abundant sulfide minerals and seem to be identical with the ore-bearing parts of the vein exposed in the mine below the fault. The leanness of the vein on the main level for about 200 feet beyond the cross fault is probably due in part to local thinness and may be related to locally higher calcite content.

COPPER PROSPECT NEAR LAKE BAY

Lake Bay is a small protected inlet off Kashevarof Passage on the northeast side of Prince of Wales Island (fig. 1). It is 5 miles southwest of the Blashke Islands, about 35 miles southwest of Wrangell, and 70 miles northwest of Ketchikan. The prospect, formerly known

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as the McCullough prospect,[34] is at an altitude of about 100 feet and is about a mile by trail and surface tram from salt water. The prospect may be reached by going in a small skiff from Lake Bay into Barnes Lake through a very narrow salt chuck that is navigable only at slack water. The trail to the prospect starts from the west side of another salt chuck that connects Barnes Lake with a large unnamed lake to the south. This salt chuck is only about a foot deep at low water and rises to about 4 feet deep at high water. Because of the tortuous channel through which the tidal waters must go to get to the second salt chuck, high water is an hour or more later than high tide at Kashevarof Passage.

The deposits are said to have been located about 40 years ago, and some development work has been done on them from time to time. The property appears to have been idle for at least 20 years and perhaps longer. All the buildings are now in ruins, although the powerhouse, which houses the hoist, Pelton wheel, and sawmill, is still standing.

The deposit is a quartz-breccia vein containing pyrite and chalcopyrite. Chalcopyrite is the most abundant sulfide mineral in the vein. The vein is approximately vertical and strikes about N. 45° W. It has been explored by a shaft 61 feet deep and by several open cuts northwest of the shaft. It is not known whether the shaft, which is now full of water, is in the vein the entire distance. Most of the open cuts have slumped. The dump from the shaft apparently has buried several of the vein outcrops. The vein crops out for about 350 feet along the southwest bank of a small creek. To the northwest and southeast the vein strikes toward the bed of the creek, and no exposures were found beyond the creek. It would be difficult to trace the vein along its strike beyond its present outcrops because of the thick cover of muskeg and stream gravels. Because the exposures are so poor it was not possible to measure the thickness of the vein accurately; however, at places where the vein is best exposed it is at least 10 feet wide.

The country rock is banded graywacke and argillite. Included within the vein are angular fragments of graywacke and argillite ranging from microscopic particles to blocks 6 inches across. They are most numerous near the margins of the vein, and at places constitute as much as 50 percent of the material. The breccia fragments apparently have controlled the deposition of the sulfide minerals to some extent, as most of the sulfide minerals are either in or near the margins of the fragments.

[34] Chapin, Theodore, Mining developments in southeastern Alaska: U. S. Geol. Survey Bull. 642–B, pp. 88–89, 1916.

Roehm [35] took two samples from the vein. Chemical analyses indicated that one contained 0.7 percent and the other 3.3 percent of copper. The places at which the samples were taken were not known. The Geological Survey party took one 10.5-foot sample across the vein about 250 feet northwest of the powerhouse. This material is thought to be representative, although, because of the scarcity of outcrops, this inference is somewhat conjectural. An analysis by S. H. Cress of the Chemical Laboratory of the Geological Survey gave 0.9 percent of copper.

BIG HARBOR COPPER DEPOSITS, TROCADERO BAY

The Big Harbor copper deposits are on the north side of Trocadero Bay on the west coast of Prince of Wales Island (fig. 1). The trail to the deposits leads from the mouth of a creek that enters a small bight about 3½ miles from the head of Trocadero Bay. The most westerly of the main workings are on the west bank of a small creek, 300 yards north of an old cabin about three-eighths of a mile from salt water. A log trail leads from the cabin for about three-eighths of a mile to the eastern workings.

Chapin [36] reported that the deposits were staked in 1907 and were later acquired by the Northland Development Co. In 1916 the property was acquired by the Southeastern Alaska Copper Corp.[37] According to records of the Geological Survey a total of 136 tons of crude ore was shipped in the years 1913 and 1916, the only years in which shipments were made. The Geological Survey has no record of the progress of the work on the deposits since 1917, but, judging from the condition of the mine and the buildings when examined in 1944, the property has been idle at least 25 years. The wharf and aerial tram leading from the main workings to the beach are in ruins.

In the west or main workings (see fig. 4) the rocks strike N. 65° E. and dip 50° to 60° NW. The ore bodies, which parallel the enclosing rocks, consist of lenses of pyrite and chalcopyrite on the footwall side of a gradational contact between greenstone schist and quartz-mica schist. The gradational zone has been altered, silicified, and mineralized with sufide minerals. At several places faults have displaced the greenstone schist and quartz-mica schist for short distances. The quartz-mica schist contains a little disseminated pyrite, but nowhere was it seen to be intensively mineralized. Chapin [38] described the quartz-mica schist band as a stringer lode and recommended that it be

[35] Roehm, J. C., Territorial Dept. Mines (unpublished report), 1942.

[36] Chapin, Theodore, op. cit. (Bull 642–B), pp. 91–93.

[37] Chapin, Theodore, Mining developments in the Ketchikan and Wrangell mining districts: U. S. Geol. Survey Bull. 662–B, pp. 69–70, 1917.

[38] Chapin, Theodore, op. cit. (Bull. 642–B).

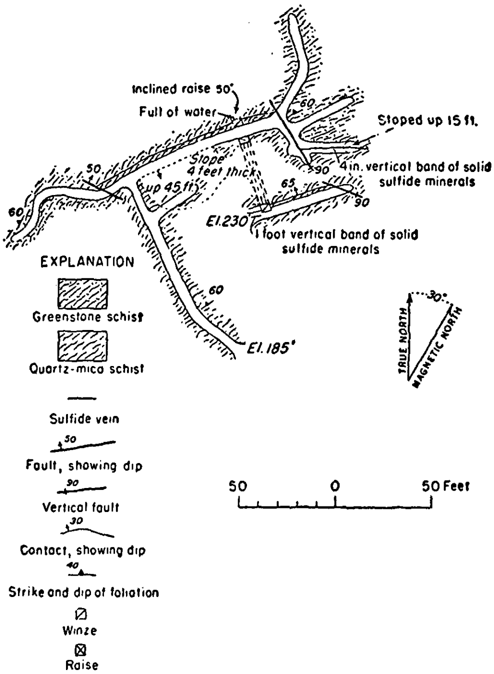

FIGURE 4.—Sketch map of main workings, Big Harbor mine, Trocadero Bay.

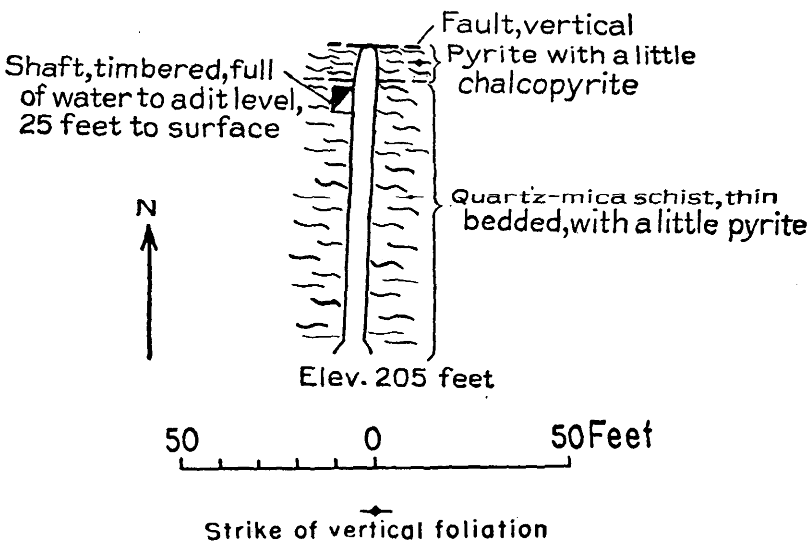

FIGURE 5.—Sketch map of east workings, Big Harbor mine, Trocadero Bay.

prospected for gold. However, it appears doubtful that this type of material would carry significant quantities of gold.

The mine is flooded below the main level. It is not known what was encountered at greater depth nor the extent of the development work below the main level. However, it is obvious from the distribution of the small amount of ore remaining in the mine and from the size of the stopes that the ore bodies were small and discontinuous. According to records of the Geological Survey the ore that was shipped contained between 6 and 7 percent of copper. No values for gold or silver are recorded. No significant amount of ore remains in the mine above water level.

The development work on the eastern deposit (fig. 5) consists of a vertical shaft that connects with a 75-foot adit 25 feet below the surface. A band of practically solid pyrite and chalcopyrite was exposed in the last 8 feet of the adit. The sulfide band strikes eastward and is vertical. An 8-foot chip sample that was taken across the band by the Geological Survey and that was analyzed by S. H. Cress, of the Chemical Laboratory of the Geological Survey, contained 1.90 percent of copper. The rest of the adit is in thinly bedded quartz-mica schist that contains a small amount of disseminated pyrite.

The openings below the adit level are now flooded, and the following data are taken from Chapin's description.[39] In 1916 the bottom of the shaft was 120 feet below the surface and was in ore for its entire length. A 24-foot crosscut 48 feet below the surface exposed 17 feet of pyrite-chalcopyrite ore and 3 feet of barren rock. On the 120-foot level 11 feet of ore and 7 feet of slightly mineralized rock are exposed, and a drill hole in the face intersected another body of ore. In 1916 it was reported that the shaft was to be extended to 500 feet, but it is not known whether this work was done.

A 30-foot adit entirely in quartz-mica schist lies 600 feet west of the east workings at an altitude of 120 feet.

The eastern deposit is so poorly exposed that it is impossible to appraise its significance. The one sample collected indicates a moderate content of copper across an 8-foot width. Furthermore, the similarity of the east workings to the ore bodies at the west workings suggests that ore bodies of minable grade may be present. On the other hand, the property was abandoned after a moderate amount of development work was done. It is not known whether the property was abandoned because of lack of a minable ore body or for some other reason.

BARITE AT LIME POINT, HETTA INLET

A deposit of barite ($BaSO_4$) on the southwest coast of Prince of Wales Island, about 45 miles southwest of Ketchikan (fig. 1), was

[39] Chapin, Theodore, op. cit (Bull. 662–B).

briefly described by Chapin,[40] who examined it in 1915. The deposit is on the south tip of a small projection of land that extends westward from a point near Lime Point on the south end of the peninsula between Hetta and Nutkwa Inlets. A 33-foot adit has been driven parallel to the strike of the body. Chapin reports that the former

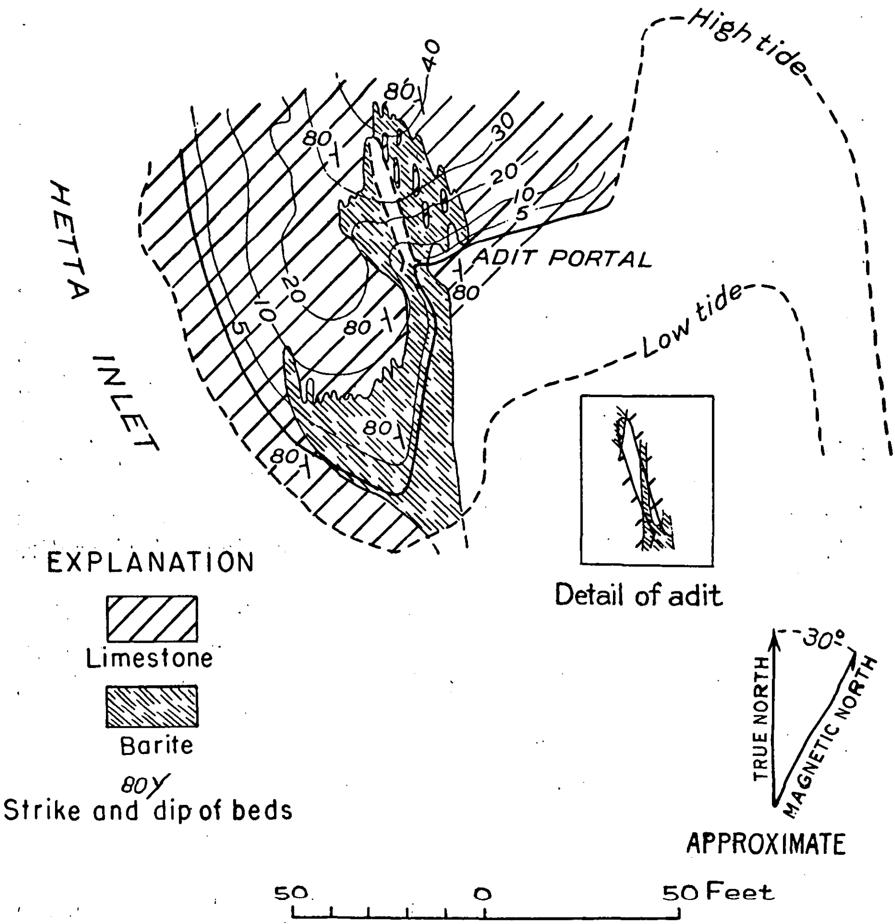

FIGURE 6.—Sketch map of the Lime Point barite deposit, Hetta Inlet.

operators shipped some of the barite to San Francisco, where it was tested with satisfactory results.

The country rock near the deposit is a dense blue-gray massive crystalline limestone that strikes N. 9° W. and dips about 80° W. (See fig. 6.) The barite is fine-grained, snowy white, and dense. It is readily distinguished by its white color from the blue-gray limestone. On the weathered surface the limestone is pitted, whereas the

[40] Chapin, Theodore, op. cit. (Bull. 642–B), p. 104.

surface of the barite is generally smooth and even. The barite-limestone contact dips steeply to the west.

From its irregular shape and the fact that the bedding in the barite and limestone is continuous across their contact it is inferred that the barite body was formed by the selective replacement of part of the original limestone. Wherever barite was seen in the outcrop the replacement was remarkably complete, and there are few places where the rock is not either pure limestone or pure barite. As a consequence the boundaries shown on figure 6 are sharp and distinct. There are several fairly large unreplaced remnants of limestone near the north end of the deposit.

A "character" sample of the barite was taken by the Geological Survey party by collecting chips from representative places over the surface of the deposit. S. H. Cress, of the Chemical Laboratory of the Geological Survey, reports that the sample contained 53.72 percent of barium; this is equivalent to approximately 91 percent of barium sulfate. Inspection of thin sections of the rock indicates that the only impurity is calcite and that the rock consists largely of fine-grained equigranular barite.

The barite body is exposed above high tide over a horizontal length of about 100 feet and ranges in width from 11 feet to 40 feet. The average width is about 21 feet. Near the face of the adit the body is exposed about 40 feet below the surface outcrop. If the barite body exposed on the surface extends downward without appreciable change to low-tide level, the deposit is estimated to be about 5,000 short tons of barite.

The rocks near the deposit were examined for other barite bodies, but none was found except for a few very small pods along the beach north of the deposit. The deposit is ideally situated for producing a small tonnage of high-grade barite. The barite could be blasted down and loaded directly on to a barge.

COPPER-LEAD PROSPECT NEAR HEAD OF NUTKWA LAGOON

Nutkwa Lagoon is a large salt-water lagoon nearly 4 miles long and about half a mile wide on the west coast of Prince of Wales Island. (See fig. 1.) It is joined to the head of Nutkwa Inlet by a "skookum chuck," through which water passes with great velocity except for a few minutes of slack water about 1½ hours before and after high tide. Only boats with drafts of a few feet can pass through the skookum chuck, and these only at slack water.

The deposit is on the northwest shore of the lagoon about three-quarters of a mile from its head. At the beach is a small cabin now in disrepair. A trail leads from the cabin for one-eighth of a mile to an adit at an altitude of 110 feet. A tool shed is near the adit portal.

The deposit has been briefly described by Chapin[41] and was formerly known as the Marion and Ella claims. The deposit was restaked in 1944 by J. S. Pitcher and A. L. Anderson.

The adit has been driven along a quartz vein that strikes N. 30° W. and dips from about 85° SW. to nearly vertical. (See fig. 7.) The vein has a maximum width of 5 feet near the face of the adit, but in general it is only 1 or 2 feet wide. It pinches and swells abruptly, and for considerable distances the position of the vein is indicated only by a fault. (See fig. 7.) The vein contains abundant bands of graywacke schist that forms the country rock, and at places schist composes almost 50 percent of the vein material. At other places the vein is not clearly defined and consists of several stringers of quartz separated by bands of schist. The vein is parallel to the foliation of the schist. At most places the vein walls are indistinct, but at some places they are well-defined and separated from the vein by 2 or 3 inches of fault gouge. The fractured nature of the vein indicates that some postmineral movement has occurred.

In addition to quartz the vein contains pyrite, chalcopyrite, galena, and calcite. Locally calcite makes up as much as 15 percent of the vein material. The sulfide minerals in general compose only a small percentage of the vein material and it is apparent from the exposure seen that the vein does not carry significant amounts of copper and lead. No data are available on the gold and silver content of the vein.

DEPOSITS ON CHICHAGOF ISLAND

SCHEELITE IN THE VICINITY OF LISIANSKI INLET

ABSTRACT OF GEOLOGY

A considerable number of mineralized quartz veins are known near the northwest tip of Chichagof Island near Lisianski Inlet, a long, narrow indentation of the island. The principal country rocks are intrusive, have a wide mineralogic range, and collectively form part of a batholith believed to have been intruded in early Cretaceous time. Some of the veins have been prospected, and a few have yielded a small production of precious metals.

APEX AND EL NIDO MINES

The Apex and El Nido mines[42] are on the southwest side of Lisianski Inlet (fig. 1) nearly opposite the small settlement of Pelican. The property is said to be controlled by Jenny R. Cann, of Seattle. In

[41] Chapin, Theodore, Mining developments in southeastern Alaska: U. S. Geol. Survey Bull. 642–B, pp. 90–91, 1916.

[42] Buddington, A. F., Mineral investigations in southeastern Alaska: U. S. Geol. Survey Bull. 773–B, p. 117 (fig. 5), 1923.

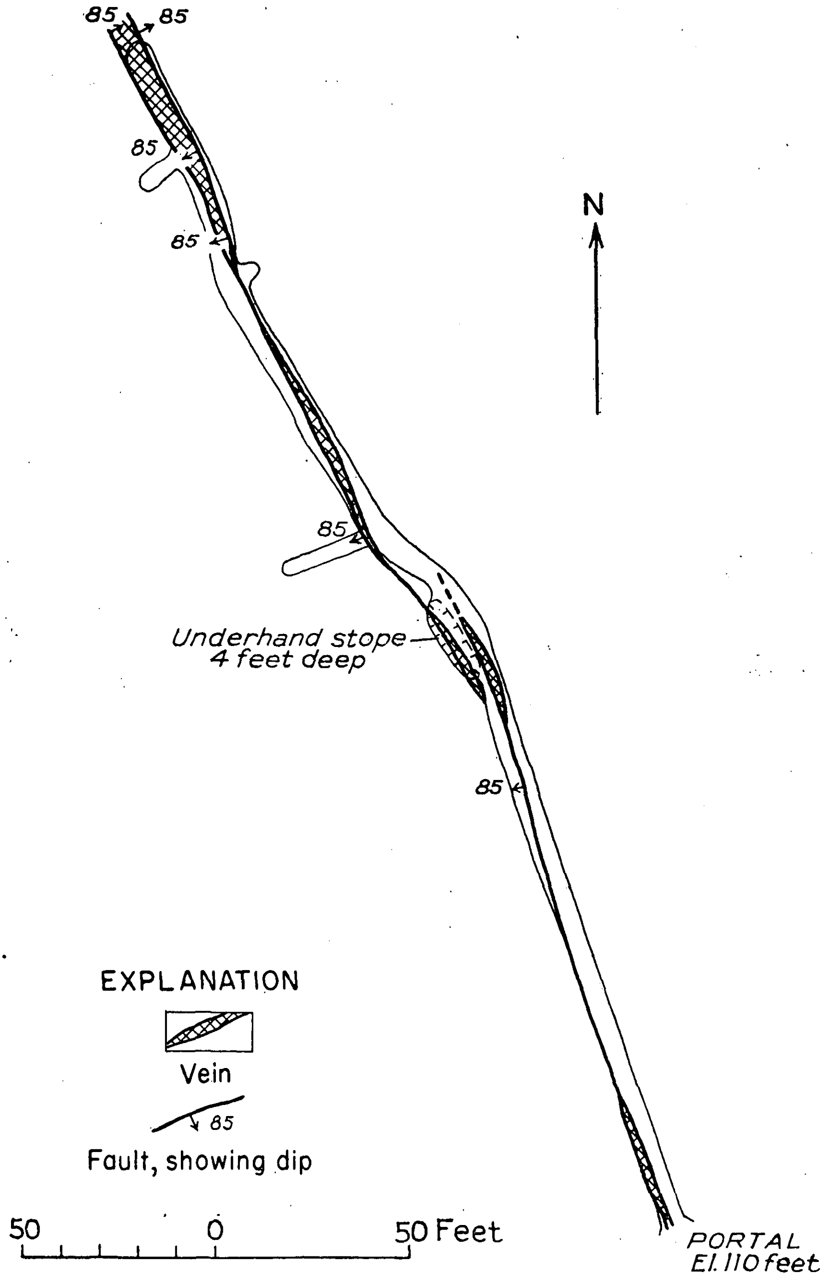

FIGURE 7.—Sketch map of vein at Nutkwa Lagoon.

1941, when the property was examined for scheelite by the Geological Survey, some work, apparently largely examination of the property, was being done under the direction of George L. Holmes, but neither mine was being operated. Production from the mines, mostly from the Apex, is said to aggregate several hundred thousands of dollars worth of precious metals, mostly gold.

Scheelite in El Nido mine has been known since 1923.[43] Buddington, in describing El Nido vein, said "the scheelite is pale yellow and occurs as disseminated grains and in narrow bands parallel to the vein walls."

The principal country rock of the vicinity is hornblende diorite. The Apex vein strikes about N. 60° E. and dips about 45° NW. The vein ranges from about 5 inches to more than 48 inches in width. In places it splits into a stockwork of branching veinlets that trend in many directions.

In 1941 scheelite was found at several places in the Apex vein, but the amount is very small and the mineral is finely disseminated. Material occupying the chutes from stopes and from levels above the No. 2 level was also examined and some of it found to contain a little scheelite. Of considerable interest was the discovery of coarsely crystalline scheelite in a fragment of silicified, light-colored dike rock in one of the chutes. The dike is typical of many pyrite- and arsenopyrite-bearing dikes of the neighborhood. Vein quartz, brightly fluorescent in blue under ultraviolet light, was seen in the Apex mine.

El Nido vein strikes between S. 60° E. and N. 85° E., and in general it dips about 60° SE. It ranges in width from 4 to 60 inches and probably averages about 10 inches. According to Buddington,[44] it fills a fracture in an aplite dike which is intrusive into the dioritic country rock.

Both adit levels of El Nido mine were examined for scheelite with an ultraviolet lamp. On the lower level, between the place where the vein is first encountered by a crosscut from the surface and a raise to the upper level, the vein contains scheelite in disseminated grains and in small streaks against the hanging wall. Near the raise the scheelite is somewhat more abundant than farther northeast, but farther back in the adit, where the vein is thin and discontinuous, scheelite is very sparsely distributed. Scheelite is abundant in the last 6 feet of the adit and in the face, where the vein is 4 to 6 inches wide.

From the place where the crosscut on the upper level encounters the vein, to the top of the raise from the lower level, scheelite is present but in very small amounts. From the raise on into the face scheelite is distributed in the vein in somewhat greater abundance. At one place, in a veinlet that diverges at a flat angle into the hanging wall from the main vein, a streak of nearly solid scheelite about 2 inches wide and 3 feet long was seen. At this place material, presumably largely scheelite, has been gouged out of both the floor and the back of the

[43] Buddington, A. F., op. cit. (Bull. 773–B), p. 120.
[44] Idem, p. 119.

adit, and the walls indicate that the veinlet, before the material was removed, was 6 inches or more in width.

Estimates based on the examination of El Nido vein with the ultraviolet lamp indicate that the vein on the lower adit level between the crosscut and the raise may carry about 0.2 percent of WO_3 and that the relatively high grade part of the vein near the face may contain about 3 percent of WO_3. The scheelite content of the vein in the upper level, except locally, is probably less than 0.2 percent of WO_3. These estimates may be widely in error.

A vein in a small abandoned mine in a basin draining into Goulding Harbor, about 7 miles southeast of the Apex and El Nido mines, was examined with the ultraviolet lamp. Although the local geology is similar, no scheelite was identified.

At no place, except possibly near the face of the lower adit of El Nido mine, does scheelite appear to be abundant enough and in large enough deposits to constitute minable bodies of tungsten ore. Possibly the lower adit should be advanced to determine for what distance and in what widths the relatively high grade scheelite continues.

MAGNETITE AT STAG BAY

The magnetite deposit at Stag Bay is on the northwest slope of Cub Mountain, on Chichagof Island. (See fig. 1.) The deposit crops out at an altitude of about 710 feet on the west side of a small creek that flows northward into Stag Bay (see fig. 8).

The deposit was visited by G. C. Kennedy for a few hours in the summer of 1942, but the limited time available did not premit more than a cursory examination. The following statements therefore reflect only general impressions.

The deposit crops out on a steep slope and is exposed in two trenches. The lower trench, about 70 feet long and parallel to the contour of the hillside, exposes 55 feet of mineralized rock consisting chiefly of magnetite with lesser amounts of gangue minerals and minor amounts of sulfide minerals. The upper trench, about 150 feet up the slope from the lower trench, exposes 35 feet of similarly mineralized materials. The deposit probably is continuous between the two trenches.

The country rock is sheared and altered fine-grained gabbro or diorite. Most of the dark minerals in the rock have been destroyed. The rock contains abundant chlorite. This type of rock is part of the pretectonic group of igneous rocks that has been described on Yakobi Island [45] and in the Chichagof mining district.[46]

[45] Reed, J. C., and Dorr, J. V. N., 2d, Nickel deposits of Bohemia Basin and vicinity, Yakobi Island, Alaska: U. S. Geol. Survey Bull. 931–F, pp. 112–113, 1942.

[46] Reed, J. C., and Coats, R. R., Geology and ore deposits of the Chichagof mining district, Alaska: U. S. Geol. Survey Bull. 929, pp. 35–40, 1941.

The mineralized rock consists largely of magnetite, epidote, and quartz. It is estimated that magnetite constitutes about 60 percent of the rock and that quartz and epidote each makes up about 20 percent of the rock. Pyrite is locally abundant, and chalcopyrite is present but nowhere exceeds 2 percent of the rock.

Further development work on the prospect should be preceded by a magnetic survey of the area. Such a survey would indicate the presence or absence of a body of magnetite of significant size.

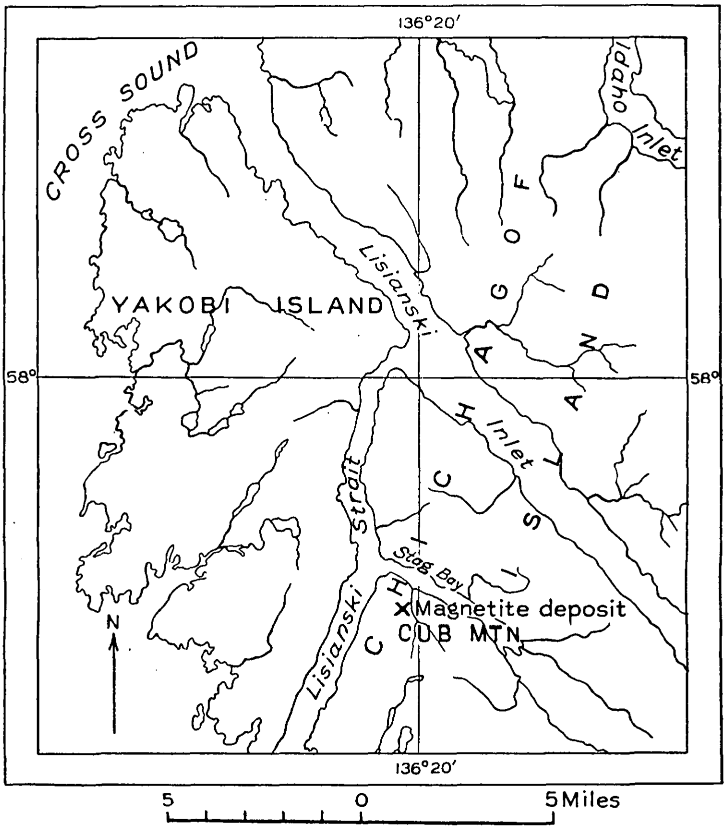

FIGURE 8.—Map showing location of magnetite deposit at Stag Bay.

GYPSUM PROSPECT AT IYOUKEEN COVE

INTRODUCTION

The only known gypsum deposits in southeastern Alaska are on the east side of Chichagof Island near Iyoukeen Cove (see figs. 1 and 9). Mining was started on one deposit in 1906 and continued with occasional interruptions until December 1923, when the mine was abandoned. In all, the property has probably produced about half a million tons of gypsum.

The deposits have been described or briefly mentioned in many Geological Survey publications, the most recent and complete description being by Stewart.[47]

A few years after the productive mine shut down eight claims known as the Gypsum-Camel group were staked in the name of

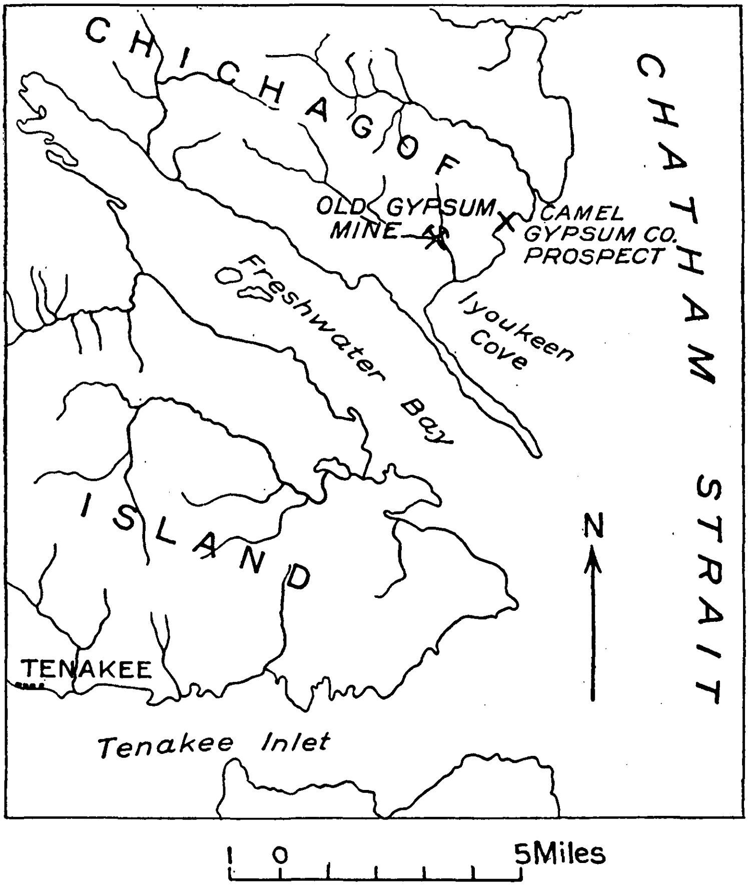

FIGURE 9.—Index map of a part of Chichagof Island showing location of gypsum mine and prospect at Iyoukeen Cove.

Larson and Anderson.[48] These claims are along the shore of Iyoukeen Cove about 1½ miles east of the old mine. (See fig. 9.) The prospect on these newer claims was visited briefly by J. C. Reed and R. R. Coats on September 23, 1939. Up to that date no gypsum had been shipped, but a few tons, recovered while driving prospect openings, were stacked on the beach.

[47] Stewart, B. D., The occurrence of gypsum at Iyoukeen Cove, Chichagof Island, Alaska: U. S. Geol. Survey Bull. 824–E, pp. 173–177, 1932.

[48] Idem, p. 174.

According to reports, the eight claims that comprise the property are owned by Dave Housel and Arvid Anderson. The latest development work, which was begun in May 1939 and which had been temporarily suspended in August shortly before the property was visited, is said to have been carried on by the Camel Gypsum Co., which is made up principally of a group of California men.

The principal development work carried on by the Camel Gypsum Co. in 1939 was the construction of a dock, which had not been floored when the prospect was visited, and the driving of a 100-foot tunnel between tunnels 2 and 3. (See fig. 10.) Some new work was also done in the three older tunnels.

GEOLOGY

Stewart[49] summarizes his observations on the geology of the locality as follows:

> It also seems evident that this body of gypsum lies unconformably on tilted and folded beds of cherty limestone and limestone breccia and is overlain by partly consolidated beach gravel and sand of recent geologic age. It is also apparent that the geologic relations of the indicated body of gypsum at this locality are similar in all essential respects to those existing at the deposit on Gypsum Creek and that the gypsum itself is of similar type and quality.

Buddington and Chapin,[50] in referring to the locality that includes the old mine, state, "The [gypsum] bed overlies Carboniferous beds and is regarded as of Permian or possible Triassic age."

The study of the prospect in 1939 was too short to furnish a detailed picture of the local geology, but the observations on the property did not show conclusively that the gypsum lies unconformably on older cherty limestone and limestone breccia. The local structure is very complex both in the gypsum bed or beds and in the associated cherty limestones and limestone breccia. The gypsum itself, as shown by the bedding planes that are locally distinguishable, is apparently more contorted than the associated rocks. This is a common feature of gypsum beds and may develop because of the great incompetence of gypsum or by the conversion of original anhydrite to gypsum with the corresponding increase in volume.

The complexity of the structure is indicated by the scattered structural data plotted in figure 10.

Most of the prospect tunnels start in the partly consolidated or unconsolidated sand, gravel, clay, and glacial moraine and then pass into gypsum or limestone. Some of the prospect openings pass through gypsum for a short distance and again break into masses of unconsolidated material. These masses are interpreted as fillings of sink-

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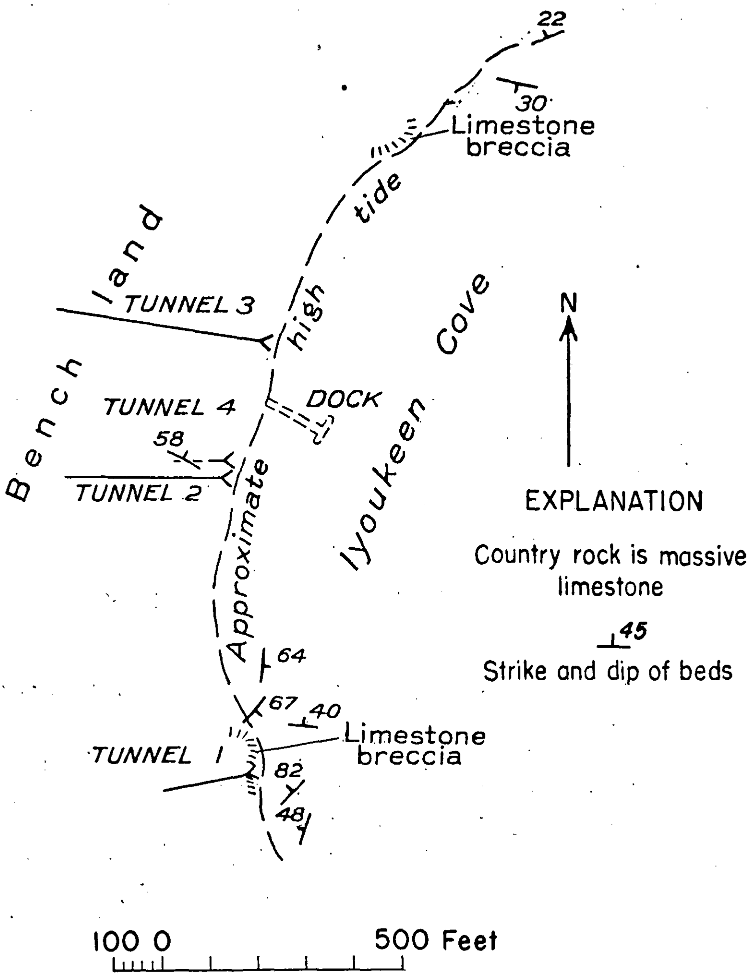
[49] Stewart, B. D., op. cit. (Bull. 824–E), p. 176.

[50] Buddington, A. F., and Chapin, Theodore, Geology and mineral depostis of southeastern Alaska: U. S. Geol. Survey Bull. 800, p. 332, 1929.



Total length of workings according to:
(a) B. D. Stewart as of 1929
(b) Operators as of 1939

	1929	1939
Tunnel 1	130 feet	190 feet
Tunnel 2	250 feet	330 feet
Tunnel 3	445 feet	?
Tunnel 4	(not drilled)	100 feet

FIGURE 10.—Sketch map of vicinity of prospect of Camel Gypsum Co., Iyoukeen Cove.

holes in the gypsum. One or two small caverns that were not filled with unconsolidated material were seen.

Stewart [51] has pointed out that the gypsum "underlies bench land adjacent to the shore of Iyoukeen Cove" and that the recent partly consolidated material dips gently toward the beach.

The gypsum, which is present as massive material and locally as small masses in a sandy claylike material, is reported to be of high quality. Much of it is white and translucent, some is slightly red, and some is gray and banded. The impression was gained that a large amount of the material may be present, and it seems likely that careful and detailed geologic work, including the sinking of drill holes from the benchland, might prove at relatively small expense the presence, location, and geologic relations of a large tonnage. Whether or not such material, even in large quantities, can be produced at a profit is an economic problem in which many factors are involved, and these should be carefully considered in any plan to develop the prospect commercially. The fact that the nearby old gypsum mine was able to operate for a long time demonstrates that the mining of gypsum in southeastern Alaska can be successful.

COPPER DEPOSIT AT WILLIAM HENRY BAY

INTRODUCTION

A deposit that was developed originally as a copper deposit is at William Henry Bay, a small inlet on the west side of Lynn Canal about 40 miles northwest of Juneau. (See fig. 1.) The deposit is on the west side of the valley of Beardslee River, which enters at the head of William Henry Bay. It is about a mile south of the head of the bay and about 160 feet above sea level. An old surface tram, now overgrown with brush, extends from the beach to the deposit.

In 1916 the property was taken over by the Alaska Endicott Mining & Milling Co. By 1919 [52] the company had driven most of the main level, and, according to reports, had produced 200 tons of ore containing 48.38 ounces of gold valued at $1,000 and 20 ounces of silver valued at $20.

The wharf and all the mine buildings, with the exception of the mill and the assay office, are now in ruins. The mill house is still in excellent condition and a 15-stamp mill, Wilfley table, flotation cells, and two Pelton wheels still remain and seem to be in good condition. The underground workings were mapped by W. S. Twenhofel and G. M. Flint, Jr., in the summer of 1944.

[51] Stewart, B. D., op. cit. (Bull. 824–E), pp. 174–175.

[52] Mertie, J. B., Jr., Lode mining in the Juneau and Ketchikan districts: U. S. Geol. Survey Bull. 714–B, pp. 109–112, 1921.

Mertie[53] has described briefly the general geology of the area adjacent to William Henry Bay. The rocks south of the bay are dominantly sedimentary, including argillite, slate, and limestone. North of the bay the dominant rocks are chiefly greenstone tuffs and related rocks. According to Mertie the contact between the greenstone sequence and the limestone-argillite rocks may run inland in a general northwesterly direction from William Henry Bay.

The country rocks at the deposit are greenstone tuffs and lava flows. In general the rocks are so altered and deformed that their attitude is not determinable, but where dip and strike observations were obtainable the rocks strike about N. 30° W. and dip steeply or are vertical.

ORE BODIES

The deposit consists of a quartz breccia vein that strikes about east and dips about 70° to the south. (See pl. 2.) The vein consists essentially of massive white quartz that includes many partly replaced angular breccia fragments of the greenstone country rock ranging from an inch to more than a foot across. Breccia fragments are most abundant near the margins of the vein and are rare near the center. Vein boundaries are indistinct. In places many smaller veins and veinlets branch off from the main vein.

The vein pinches and swells abruptly and is offset by numerous faults of small displacement. (See pl. 2.) At most of the faults the vein on the west side is displaced to the north with reference to the vein on the east side of the fault. At a point 1,350 feet in from the portal the vein has been offset by a fault of unknown displacement, beyond which the vein has not been discovered in spite of the numerous exploratory drifts that have been made in search for it. (See pl. 2.)

In 1944 only the underground workings were examined, but Mertie[54] states that the vein crops out on the hillside west of the mine at an elevation of 500 feet. At the surface the vein is about vertical and is about 12 feet thick. It contains chalcopyrite and pyrite in a quartz and calcite matrix.

The principal ore minerals are chalcopyrite and lesser amounts of pyrite. In addition to quartz, which makes up most of the introduced vein material, there are small irregular veinlets and pods of calcite. The sulfide minerals are fine-grained and are most abundant near the margins of the vein and in the breccia fragments. Sulfide minerals also occur as small irregular masses, stringers, and streaks of extremely fine-grained material that are parallel to the margins of the vein.

It is obvious that very little of the vein that is exposed underground was deemed to be minable by the former operators of the mine. Only

[53] Mertie, J. B., Jr., op. cit.
[54] Idem.

three small stopes were excavated, although considerable vein material was removed in the course of driving the many feet of drift. Although the deposit was opened as a copper mine it was apparent from inspection that the vein does not contain sufficient chalcopyrite to be copper ore. It is estimated that the vein, with the possible exception of the material from the stopes, does not carry more than 0.25 percent of copper. Inspection of the walls of the stopes indicates that the ore mined probably contained at least 8 percent of sulfide minerals, whereas the rest of the vein contains less than 2 percent.

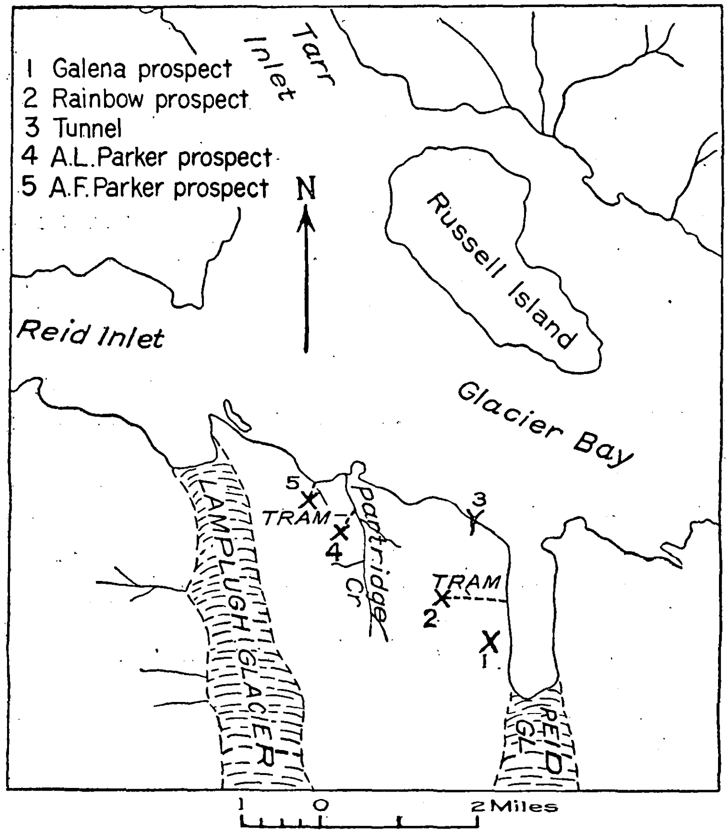


FIGURE 11.—Sketch map showing locations of prospects between Reid and Lamplugh Glaciers, Glacier Bay.

PROSPECTS BETWEEN REID AND LAMPLUGH GLACIERS, GLACIER BAY

INTRODUCTION

Several small prospects between Reid and Lamplugh Glaciers in the Glacier Bay National Monument (figs. 1 and 11) were examined briefly in July 1940. The locality had been studied by Reed in more detail in 1936 as part of a systematic investigation of most of the known prospects of Glacier Bay.[55]

The following outline of the general geology and of the veins in the vicinity of Reid and Lamplugh Glaciers is quoted from Reed's report:

> The principal country rock of the area * * * appears to be granite. The granite contains different-sized masses of engulfed older sediments which are siliceous and possibly originally were sandstones. Marble and slate crop out along the east side of Reid Glacier and on the divide between Reid and Lamplugh Glaciers * * *. The granite and older rocks are cut by dark-colored dikes including many of lamprophyre and perhaps some of other rocks. * * *
>
> The bed rocks of the * * * vicinity are cut by quartz veins that range in thickness from a small fraction of an inch to as much as 18 inches. Several of the veins were traced horizontally for about 400 feet and for about the same distance vertically. One, with some interpolation, is mapped for a horizontal distance of about 1,600 feet and over a vertical range of more than 800 feet. * * *
>
> The granite of the country rock is commonly intensely altered for several feet on each side of a vein. In several places fractures were observed along which alteration has taken place but which contained no vein. Locally several thin veinlets occupy single fracture zones. The altered zones are apparent in the field because of their conspicuous bright color due to hydrated oxides of iron. * * * Many of the altered zones are 20 feet thick, and few are less than 10 feet.
>
> The quartz of the veins is commonly banded, with comb quartz and vugs near the centers. The walls are free and are locally marked by a little gouge. Ore minerals observed include pyrite, marcasite, sphalerite, galena, and chalcopyrite. Of these, pyrite and sphalerite are the most abundant.

HISTORY, PRODUCTION, AND DEVELOPMENT

CLAIMS OF J. P. IBACH

The first two mining claims in the vicinity of Reid Glacier were staked in 1924 by J. P. Ibach for himself and his associates. In 1936 he staked a large number of claims and collected in all about 5 tons of ore from several prospects. The ore was taken to Lemesurier Island in Icy Strait near the mouth of Glacier Bay, where it was milled in a 2-ton Gibson mill.

In 1936 no ore was mined, but a considerable amount of prospecting is said to have been done. The Rainbow prospect (No. 2 on fig. 11) yielded almost 7 tons of ore in 1938. Ibach and Tom Smith are said to have produced 30 tons of ore from the Galena prospect (No. 1 on fig. 11) in 1939.

An aerial tram to the Rainbow prospect was constructed early in the summer of 1940. The prospect is at an altitude of about 1,900 feet, and the slope distance to tidewater is about 3,500 feet. In 1940, up to July 1, 11 tons are said to have been produced from the Rainbow

[55] Reed, J. C., Some mineral deposits of Glacier Bay and vicinity, Alaska: Econ. Geology, vol. 33, No. 1, pp. 52–80, January–February 1938.

prospect. It is reported that Ibach continued small-scale mining in the years 1941 and 1944.

CLAIMS OF A. L. AND A. F. PARKER

A. L. Parker holds two claims (No. 4 on fig. 11), the Lincoln and Le Roy in the vicinity of Partridge Creek, a small stream about halfway between Reid and Lamplugh Glaciers. The claims were staked in 1938. A road leads from the beach up Partridge Creek about 2,400

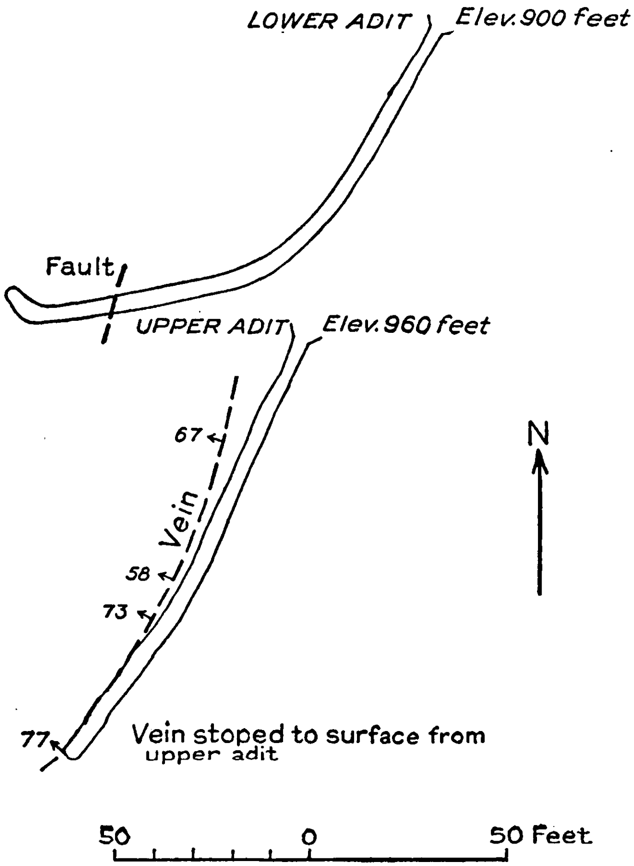


FIGURE 12.—Sketch map of workings at A. L. Parker prospect, Glacier Bay.

feet to a house that is near the foot of an aerial tram from the prospect. The tram is about 2,300 feet long.

In 1939, according to A. L. Parker, 3,300 pounds of ore were shipped to the Tacoma smelter. The property was optioned by Le Roy Mining Co. in 1940, and that company started operations early in 1941. A compressor, mill, and other mining equipment were installed. The company started mining on the upper level (fig. 12) and stoped the ore to the surface, about 70 feet above the upper level at the face. In 1942, when the property was visited by Reed and Twenhofel, there was still ore in the face of the upper level. A lower level, about 60 feet below the upper level, had been driven about 140 feet in 1942 without encountering ore. According to the operators, about 250 tons of ore was mined in 1941, from which was recovered a little more than $45,000. In 1942 it is reported that the company exceeded its 1941 production. No data are available on the operation of the mine since 1942.

A. F. Parker's prospect (No. 5 on fig. 11) is farther west than the prospect of A. L. Parker and is nearer Reid Inlet. The property was staked in 1938. The prospect is at an altitude of 850 feet and is connected with tidewater by an aerial tram. The tram is powered with a 2-horsepower gasoline motor. According to reports, A. F. Parker had produced 7 or 8 tons of ore from his prospect up to July 1940. Forty-two sacks of ore were seen at the loading platform at the head of the tram and 15 more part way down where the grade of the tram changes abruptly.

VEINS

GALENA PROSPECT

Trenches near and along a small stream at the Galena prospect have exposed for about 60 feet a vein that ranges from 4 to 18 inches in width. A specimen of the banded and vuggy quartz shows abundant pyrite, sphalerite, and galena. In 1936, when the vein was not as well exposed as it was in 1940, Reed cut a sample across the full width at a place where it is 12 inches wide. An assay of the sample showed 0.16 ounce of gold and 0.30 ounce of silver per ton and 0.79 percent of zinc. According to the owner, the average value of the vein material is about $60 per ton.

RAINBOW PROSPECT

The vein at the Rainbow prospect crops out on a precipitous slope. It strikes about N. 7° W. and dips 70° W. Along the vein fracture is considerable gouge and crushed quartz. The vein material, including the gouge, has been scraped out of the fracture for a length of about 100 feet and to a maximum depth of about 10 feet. The material is said to average about $100 per ton, and some is said to be worth $360 per ton. A sample cut by Reed in 1936 across a width of 18 inches contained 0.97 ounce of gold and 0.50 ounce of silver per ton and 1.08 percent of zinc. When the prospect was visited in July 1940 a considerable amount of sacked ore was being held at the prospect pending the repair of the tram, which was temporarily out of commission.

TUNNEL

A 30-foot tunnel has been driven southward from just above high-tide level of Reid Inlet (No. 3 on fig. 11) along a fracture that dips about 70° SE. The walls of the fracture are of siliceous, chertlike rock that possibly originally was sandstone. The material in the vein fracture is largely crushed wall rock, quartz, and gouge and is highly colored with limonite. On the hill not far above the tunnel, vein quartz occupies the same fracture.

A. L. PARKER PROSPECT

Prospecting on the A. L. Parker property has been mostly on Le Roy claim at an altitude of about 900 feet at the head of the aerial tram (No. 4 on fig. 11). A number of small veinlets have been prospected slightly. The principal vein at the property is a quartz vein that strikes about N. 30° E. and dips steeply to the northwest. (See fig. 12.) The vein pinches and swells and averages about 2 feet in width. The main pay streak is on the hanging wall of the lead; locally there is also a footwall pay streak. In general the veins strike about N. 25° E., and they dip steeply northwestward.

Free gold was seen in some of the ore. Other ore minerals are sphalerite, galena, and pyrite. The ore minerals are estimated to constitute between 5 and 8 percent of the vein material.

A. F. PARKER PROSPECT

The A. F. Parker prospect (No. 5 on fig. 11) is opened by a 20-foot tunnel that has been driven southwestward along a fault that strikes N. 70° E. and dips 86° SE. A fault that strikes N. 66° E. and dips 64° NW. cuts off the fault just mentioned at the face of the tunnel. A third fault crops out at the portal. It strikes N. 5° W. and dips 85° E. In the face of the tunnel four quartz veinlets, each ½ to 1 inch wide, are exposed in 10 inches of gouge. These are parallel to the fault along which the tunnel was driven.

All the fault fractures contain quartz veinlets, at least locally. At the portal 1 inch of quartz occupies the northwestward-dipping fault, but the quartz is discontinuous. In the fault that trends N. 5° W. 1 inch to 1½ inches of quartz pinches out within a few feet.

The quartz, which locally is comby, contains galena and pyrite. A little free gold was seen in it. The 7 or 8 tons of ore that have been mined from the prospect probably came from near the intersection of the faults that trend N. 70° E. and N. 66° E., respectively.

ASBESTOS ON BEAR CREEK, ADMIRALTY ISLAND

An asbestos prospect is near the north end of Admiralty Island about 1½ miles from the shore and about 20 miles west of Juneau. (See fig. 1.) The prospect is reached by a good trail from a small cove at the mouth of a creek locally known as Bear Creek. (See fig. 13.) The prospect is about 140 feet above sea level and crops out on the east side of a steep cutbank of a tributary to Bear Creek. At the mouth of Bear Creek are several cabins that were built by the owners of the deposit. A rail tram was started from the cove to the deposit, but it was completed only for a short distance.

The deposit was first located by the late Augustus de Roux, of Juneau.

The prospect was examined by B. D. Stewart,[56] of the Territorial Department of Mines, in 1928 and by W. S. Twenhofel and G. M. Flint,

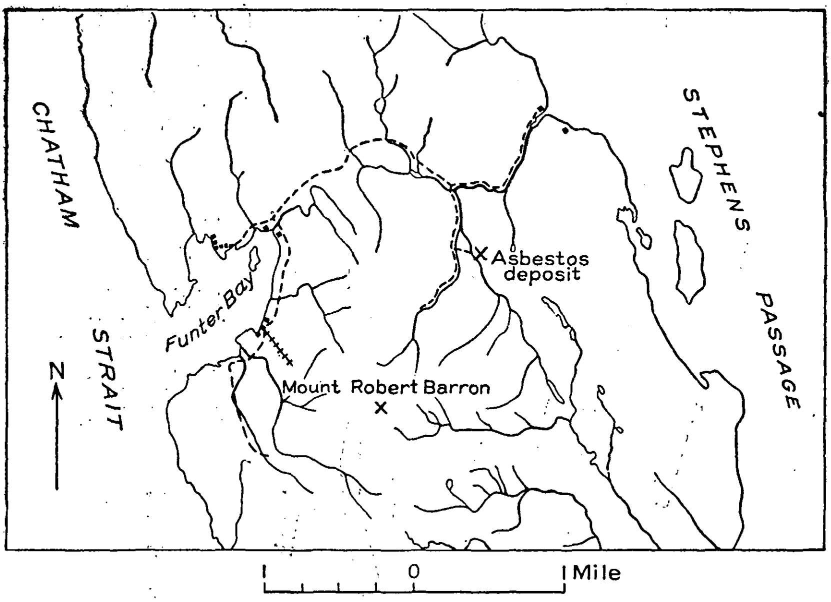


FIGURE 13.—Sketch map showing location of Bear Creek asbestos deposit, Admiralty Island.

Jr., of the Geological Survey, in 1944. The deposit was not as well exposed in 1944 as in 1928.

The asbestos crops out as a band in amphibole schist that is exposed in a steep cutbank of a small stream. Apparently at one time a small amount of trenching was done, but subsequently the bank has slumped and the asbestos is poorly exposed. However, with a small amount of effort the bank could be trenched to expose the asbestos band for a strike length of at least 60 feet. In 1944 the asbestos was exposed for a length of 14 feet, and in places where both walls of the band were seen it was 1½ feet wide. (See fig. 14.) The asbestos band is parallel to the foliation of the enclosing schist, which strikes about N. 45° W. and is vertical.

The asbestos occurs as leaves and sheaves of parallel fibers, as much as 18 inches long, that are parallel to the strike of the band. The mate-

[56] Stewart, B. D., Occurrence of tremolite asbestos on Admiralty Island, southeastern Alaska, Territorial Dept. Mines (unpublished report).

rial is soft and compact and breaks across the fibers into small pieces and chunks. A small sample collected by the Geological Survey was tested and found not to meet the specifications for commercial asbestos. However, only a small part of the asbestos band is exposed, and that part is probably weathered. The possibility that the asbestos is of better grade beneath the surface outcrop or along the strike should

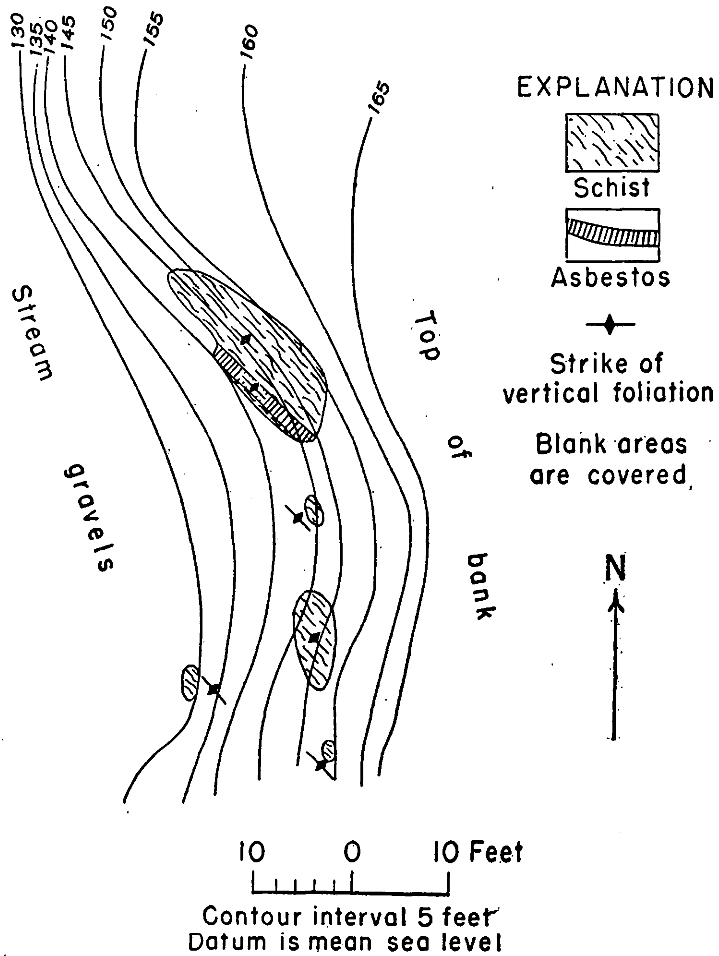


FIGURE 14.—Sketch map of Bear Creek asbestos deposit, Admiralty Island.

not be overlooked. The tensile strength of the fibers, at least on the surface outcrops, is not great. Most of the material does not break readily into fibers, and for this reason it is considered to be of poor quality. Parts of the sheaves are silicified.

Within the enclosing schist are a few veinlets, about 6 to 8 inches long and three-quarters of an inch wide, of cross-fiber asbestos. The material in these veinlets appears to be of good quality, and it separates readily into thin fibers that are limited in length by the width of the veinlet. The amount of cross-fiber asbestos present is believed to be small.

The asbestos has been reported erroneously to be of the chrysotile variety,[57] but the material collected in 1944, both the cross-fiber and the parallel-fiber material, has been identified as of the tremolite variety. Possibly the specimen that had previously been identified as chrysotile was not from the Admiralty Island deposit.

If further development of the property is undertaken, it is recommended that additional information on the quality of the material be obtained. This would involve excavating the asbestos band along its strike and beneath the weathered outcrop. Asbestos is generally mined by the company that processes it. Some asbestos that may be usable by one company may not be usable by another manufacturer who has been using a slightly different type of material. Thus it is apparent that once the quality of the asbestos on Admiralty Island has been determined it will be necessary to ascertain whether any manufacturer desires that type of material.

COPPER PROSPECT NEAR HEAD OF DUNCAN CANAL

A copper prospect is on the east side of Kupreanof Mountain about 4 miles north of the head of Towers Bay, which is in Duncan Canal about 15 miles northwest of Petersburg. (See fig. 1.) It was discovered about 1900 and was owned early in its history by the Portage Mountain Mining Co., which also held the claims on Portage Mountain about 6 miles east.[58] Prior to 1918 the Northern Copper Co. took over the property and started the construction of a plank truck road from Towers Bay to the deposit.[59] Only 4¾ miles of the road had been completed when work was stopped. The property has been idle since, and little if any ore has been shipped. The plank road is in ruins.

Buddington[60] has described the deposit and its mineralogy, and the salient features mentioned are summarized below: The ore minerals are chiefly pyrrhotite and chalcopyrite, which occur as veinlets and blebs replacing pyroxene granulite. Minor amounts of sphalerite and magnetite are present also. The hanging wall of the pyroxene granulite is highly altered fine-grained diorite, and the footwall is interbedded slate and chert. The pyroxene granulite consists of euhedral pyroxene crystals, with interstitial quartz and a little garnet.

[57] Smith, P. S., Mineral resources of Alaska, 1929: U. S. Geol. Survey, Bull. 824, p. 80, 1932.

[58] Wright, F. E. and C. W., The Ketchikan and Wrangell mining districts, Alaska: U. S. Geol. Survey Bull. 347, pp. 141–142, 1908.

[59] Buddington, A. F., Mineral deposits of the Wrangell district, southeastern Alaska: U. S. Geol. Survey Bull. 739–B, pp. 70–72, 1923.

[60] Idem.

Development work on the property consists of a 40-foot shaft with a drift at the bottom, a 375-foot adit, a 120-foot trench, and several open cuts that have largely slumped. (See fig. 15.) The shaft was not entered by the Survey party that visited the property in 1944, but sulfide minerals were seen on the dump. The trench exposes irregular masses and bands of mineralized pyroxene granulite. Although the pyroxene granulite is poorly exposed, the exposures in the trench indicate that it strikes about N. 55° E. and dips 10° to 20° SE. The 375-foot adit is about 150 feet lower than the other workings. It

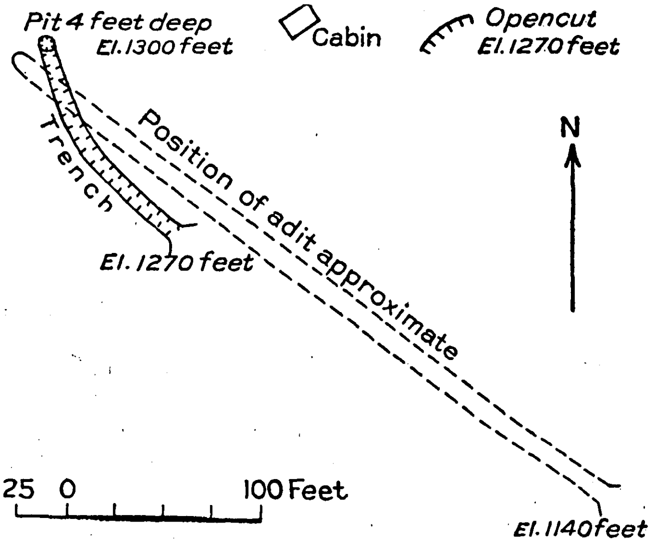


FIGURE 16.—Sketch map of adit 1 at lead prospect on Coronation Island.

encountered no sulfide minerals and was driven in horizontally bedded black slate.

Because exposures are so poor it is difficult to estimate the amount of the sulfide minerals. However, it is estimated that chalcopyrite may make up 1 percent of the mineralized material and pyrrhotite 5 to 10 percent.

LEAD PROSPECTS ON CORONATION ISLAND

Coronation Island lies at the entrance of Sumner Strait about 6 miles south of the south tip of Kuiu Island and about 80 miles southwest of Wrangell. (See fig. 1.) According to the Wrights,[61] galena was discovered in 1900 by sailors who were stormbound in Egg Harbor, on the north end of the island. In 1902 the Coronation Island Mining Co. acquired the property and for several years carried on operations.

[61] Wright, F. E. and C. W., The Ketchikan and Wrangell mining districts, Alaska: U. S. Geol. Survey Bull. 347, pp. 190–191, 1908.

It is reported that more than 100 tons of ore have been mined and shipped.

Most of Coronation Island is underlain by white massive limestone and marble. Bedding is largely obscured by folding and metamorphism. Near the center of the island is a large mass of intrusive diorite.

The deposits are above timber line at elevations of 800 to 1,100 feet on Pin Peak on the west side of Egg Harbor. A good trail leads from

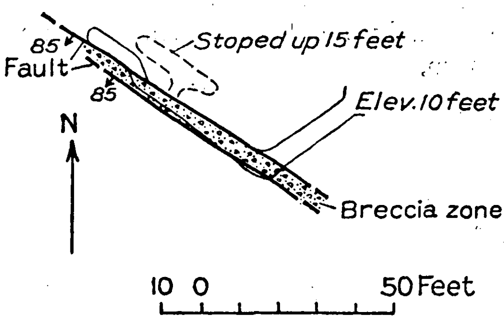


FIGURE 16.—Sketch map of adit 1 at lead prospect on Coronation Island.

tidewater on the west side of Egg Harbor, from a point a few feet north of the most southerly cave at high-tide level, to adit 1 at an altitude of 1,020 feet. (See fig. 16.) About a quarter of a mile north of adit 1 is adit 2 at an altitude of 900 feet. (See fig. 17.) An old tramline leads from adit 2 to the beach a few hundred feet north of the point where the trail starts up the mountain. The Wrights[62] mention a third adit, but this was not found when the area was examined in 1944. The old tramline follows a steep, narrow gully up

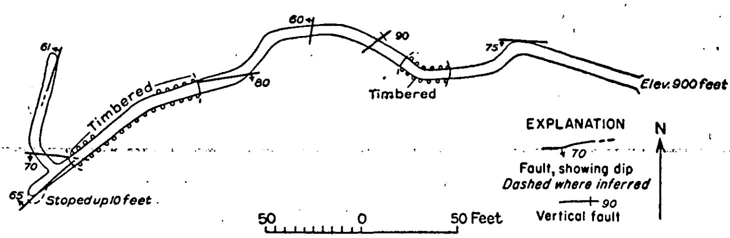


FIGURE 17.—Sketch of adit 2 at lead prospect on Coronation Island.

the mountainside, and near the top of the tramline above adit 2 old planks and timbers are buried in an avalanche of slide rock. The portal of the third adit probably is now buried beneath this debris.

The ore bodies in the two adits examined have been completely mined out; in fact, neither galena nor any other sulfide mineral was seen. However, it is apparent that the ore bodies were lenticular

[62] Wright, F. E. and C. W., op. cit. (Bull. 347).

masses in fault zones. Numerous faults were seen on the surface. Within the faults are zones as much as 4 feet wide containing brecciated limestone fragments cemented by gouge and clay. The galena ore was deposited in some of the wider parts of the faults. Some parts of the faults are iron-stained on the surface, and the larger of these have been prospected by small pits. At most, the ore bodies could not have been more than about 10 or 20 feet in greatest dimension.

It is probable that other ore bodies are present in the fault zones, but their value probably would not be commensurate with the effort needed to find them.

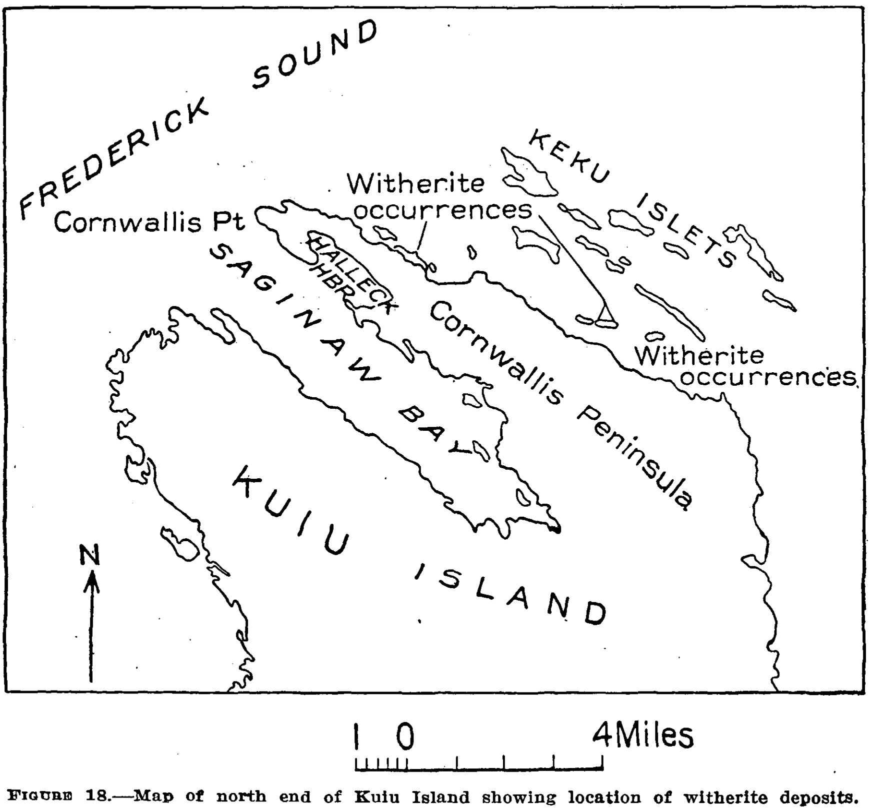


FIGURE 18.—Map of north end of Kuiu Island showing location of witherite deposits.

WITHERITE DEPOSITS NEAR THE NORTH END OF KUIU ISLAND

INTRODUCTION

Short, widely separated stringers of witherite ($BaCO_3$) associated with stringers of barite ($BaSO_4$) occur in volcanic rocks along the northeast shore of the Cornwallis Peninsula on Kuiu Island and in limestone on one of the Keku Islets. (See figs. 1 and 18.) The deposits on the Cornwallis Peninsula were discovered by George Comstock about 1931. Specimens from these deposits were identified as witherite by B. D. Stewart. Later, E. S. Hungerford found witherite on one of the Keku Islets. There has been no development work at either locality.

A few thin stringers of witherite have also been reported on the northeast shore of the Cornwallis Peninsula south of the small island where witherite was found and also about a mile farther southeast; on the southwest shore of Saginaw Bay; and at the head of the first bight west of the mouth of Saginaw Bay. All the localities mentioned in this paragraph, except the one farthest southeast on the northeast shore of the peninsula, which was covered with snow, were examined by G. O. Gates in the winter of 1942, and no witherite was found. Four days were spent in these examinations.

WITHERITE DEPOSITS ON THE NORTHEAST SHORE OF THE CORNWALLIS PENINSULA

Short, discontinuous, and widely separated stringers of witherite and stringers and veins of barite are exposed along the northeast shore of the Cornwallis Peninsula, between points 2½ and 3½ miles southeast of the Point Cornwallis Light. (See fig. 18.) Between these two points a sequence of acidic tuffs, breccias, and lava flows has been beveled by wave action to form a bench 50 to 200 feet wide. This bench is backed by steep slopes and bluffs largely covered with vegetation. The stringers of witherite and barite are exposed on the bench between high- and low-tide levels. To the northwest and southeast of the volcanic rocks the shore consists of bold cliffs of limestone in which stringers also are present, but these consist entirely of calcite.

STRUCTURE

The volcanic rocks dip gently and are much broken by irregular nearly vertical fractures that can be grouped roughly into two sets. One set consists of fractures, spaced 30 to 100 feet apart, that can be traced all the way across the bench. These strike N. 30° to 70° W. Obscure slickensides and reversals of dips of the volcanic rocks indicate that there has been some movement along these fractures but not enough to form breccia and gouge. Adjacent to these fractures or faults the rocks are more broken. The fractures of the other set, which are spaced a few inches to a few feet apart, strike north to N. 20° W. and are a few inches to a few feet long.

VEINS

Some of the fractures of both sets have been filled with either barite or witherite. The two minerals are associated in the same stringer in only a few fractures.

Barite veins and stringers.—Most of the mineralized fractures are filled entirely with barite. These have been described by Buddington.[63] Bunches of barite as much as 5 feet in diameter are present in a few places. With the exception of one vein 1 foot to 2½ feet wide, which can be traced for 200 feet, most of the barite occurs in stringers 1 inch to a few inches wide and a few inches to a few feet long.

Witherite stringers.—Most of the witherite stringers are less than an inch wide and are a few inches to a few feet long. (See fig. 19.)

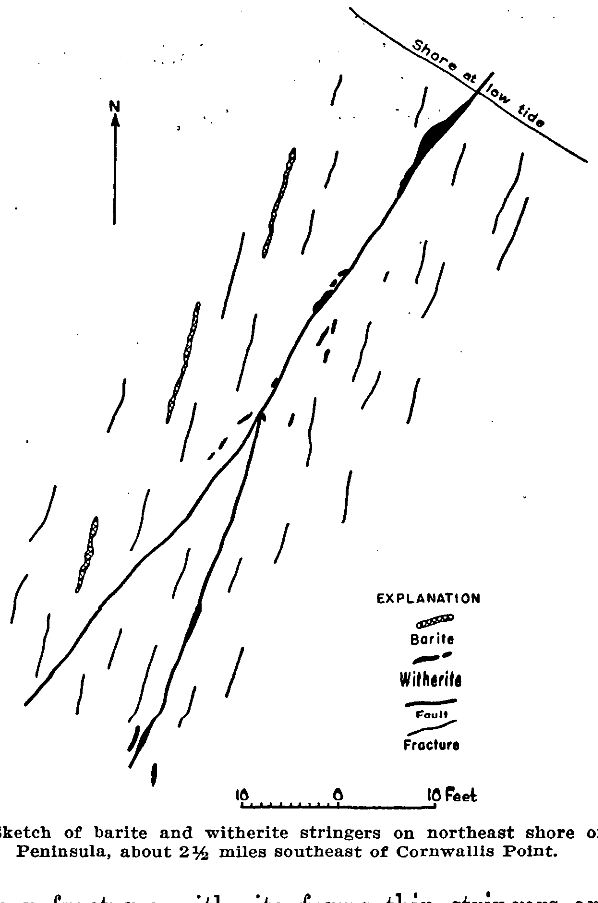


FIGURE 19.—Sketch of barite and witherite stringers on northeast shore of Cornwallis Peninsula, about 2½ miles southeast of Cornwallis Point.

In the larger fractures witherite forms thin stringers and locally lenticular pods a few inches wide and a few feet long. Along one of the longer fractures stringers and pods of witherite were traced for 150 feet.

Barite and witherite stringers.—In most of the fractures that are filled with both witherite and barite one part of the stringer will be entirely barite and another part entirely witherite. In a few places witherite and barite are intergranular.

[63] Buddington, A. F., Mineral investigations in southeastern Alaska: U. S. Geological Survey Bull. 773–B, pp. 136–138, 1925.

WITHERITE DEPOSITS ON ONE OF THE KEKU ISLETS

Stringers of witherite are exposed at the northwest and northeast corners of the easternmost of the two long islands nearest the northeast shore of the Cornwallis Peninsula and about 6.5 nautical miles southeast of Point Cornwallis Light. (See fig. 18.)

At this locality witherite stringers are associated with stringers of barite and calcite. All these stringers cut fine-grained gray limestone, which in some places has been recrystallized to pods of coarse-grained calcite several feet in diameter. The stringers are mostly less than 2 inches wide and a few inches to a few feet long. Stringers of barite predominate and are found along the entire shore of the island. Witherite is localized at the northwest and northeast corners of the island.

WITHERITE AT NORTHWEST CORNER OF ISLAND

The largest stringer of witherite found on the island is at the northwest corner. The stringer pinches out at each end and follows a curving fracture from the low-water line for 46 feet across a rocky shore. From north to south the strike changes from N. 25° E. to N. 4° E. and the dip ranges from 75° to 85° E. In a 12-foot interval near the center of the outcrop the stringer is a vuggy pod 4 to 7 inches wide; the other parts are ¼ inch to 2 inches wide. Except for a border of coarse-grained calcite along each wall of the central pod, the stringer consists entirely of witherite. A few smaller stringers of witherite crop out on either side of this stringer.

Barite stringers are present here as elsewhere along the shore of the island.

WITHERITE AT NORTHEAST CORNER OF ISLAND

At the east end of the island a number of nearly vertical basalt dikes, 10 feet to several tens of feet wide, cut the limestone in a northwesterly direction.

The barite stringers at this place have been described by Buddington.[64] Only one of these differs from those described elsewhere in this report. In addition to barite, one stringer contains considerable anhedral pyrite, a few streaks of galena, and some late witherite. Most of the stringers of barite are in limestone, but a few cut basalt dikes.

The witherite is contained largely within a zone in the limestone. This zone is about 80 feet wide and is cut by closely spaced, anastamosing seams and veins of fine-grained quartz. Some barite and calcite also are present in this zone. Numerous vugs lined with drusy quartz are common throughout the zone. A few of the vugs are filled with witherite, and the zone also contains a few stringers of witherite, the

[64] Buddington, A. F., op. cit. (Bull. 773–B), p. 136.

largest of which is 17 feet long and extends to 7 feet below low tide. The stringer strikes N. 50° E. and dips 65° NW. It is ¼ inch to 1 inch wide except at the center, where it swells to form a pod 2 feet long and 5 inches wide. It is bordered by bands of coarse calcite 1 inch wide.

MINERALOGY

The barite is white or pink, and platy except in some of the larger veins, where it is fine-grained.

The witherite is bluish white. Surfaces that are exposed to wave action are milky white and very conspicuous. Freshly broken surfaces show a characteristic radiating columnar structure, which in some places is combined with concentric banding perpendicular to the columns.

ORIGIN OF THE DEPOSITS

Buddington [65] states:

> The origin of the veins is not evident. Basalt dikes, however, are found in their vicinity, and there is a possibility that the mineralization followed the intrusion of these dikes and was effected by solutions that originated in the same underlying magma as the dikes and deposited their dissolved mineral matter in the fissured volcanic rock, conglomerate, and limestone. The structure of the veins and the association of chalcedony with the barite at one locality suggest that they are of the low-temperature, low-pressure, near-surface type.

The association of the witherite and the barite stringers indicates that the two minerals had a common source. Most of the witherite was probably a little later than the barite, though intergranular witherite and barite in a few stringers indicate some overlapping.

POSSIBILITY OF COMMERCIAL WITHERITE DEPOSITS

None of the known witherite deposits is of commercial value. Although the wide distribution of the witherite stringers shows that witherite almost certainly occurs at other places in the vicinity, the indications are that these also are small. The witherite fills fractures with little or no replacement of country rock. Furthermore, the country rock is broken by many small fractures instead of by a few large faults. Hence the solutions that deposited the witherite probably were dispersed in many small channels rather than concentrated in a few larger ones.

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[65] Buddington, A. F., op. cit. (Bull. 773–B), p. 137.

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