MR 112-6A

R E P O R T

on the property of

THE ADMIRALTY - ALASKA GOLD MINING COMPANY

Funter Bay

Alaska

MR 112-2A
112-1C

(copy)

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Certified Correct

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FORWARD

The writer has visited the property of The Admiralty-Alaska Gold Mining Company on three separate occasions. Upon two of these he devoted considerable time to examination of the property, assay records and engineer reports from the view-point of economic geology. He has also examined the drill core produced in the course of underground exploration of the Mertie vein.

The following text embodies the principle results of these studies. The data used is in all cases either the result of personal observation or of a character that thoroughly accords with all related determinations and impressions of the writer.

GENERAL INFORMATION

The property includes about 100 mining claims or some 2,000 acres in all, fronting on the southeasterly shore of Funter Bay, Admiralty Island, Alaska. It thus fronts on a good harbor near a main traffic lane and enjoys freight rates similar to those of the Juneau mining district, eighteen miles to the East.

Much of the property is heavily timbered with excellent stands of spruce and cedar, so that lumber to meet every possible need is available at cost of logging and milling.

The climate is favorable to all year operations, with

no excessive heat in summer, and little very cold weather at any time.

Precipitation is heavy and considerable storage is afforded by snowbanks that in places last well toward the end of summer. Moderate water power, already partly developed, is thus afforded by local runoff. Although susceptible to some further development local water power possibilities are inadequate for any very large demand. A large power site reported upon by the Geological Survey is said to be available some 20 miles distant from Funter Bay.

TOPOGRAPHY

A lowland belt about half a mile wide extends back from the shore of Funter Bay to the foot of the mountain slopes. Beyond this the mountains rise steeply toward the general upland axis of the island. The area of the property is thus divided topographically between undulating plain 20 to 50 feet above sea level and mountain slope and upland that rise in a short distance from the level of the lowland to over 3000 feet.

Both lowland and mountain are bedrock features, developed by the same agencies of stream and glacial erosion. Their contrast is due to difference in resistance to erosion of their respective geologic formations. The difference between

upland and lowland parts of the area is thus not only topographic but geologic as well. In keeping with topographic and geologic difference there is also a great difference in vein formations and character of mineralization between upland and lowland sections of the property.

GENERAL GEOLOGY

The rocks of the Funter Bay area in general represent a primary series of interbedded sediments and lava and secondary intrusive igneous rocks that range widely in age and composition. All excepting the younger intrusive rocks have undergone regional metamorphism and, excepting limestone, which is now marble, are altered into various types of schist. Only the later intrusive rocks have escaped complete recrystallization and only a few of the most recent dike rocks have retained much of their original mineral composition.

The younger intrusive rocks of the lowland area tend generally to be more acid in type, finer in grain and to have had less metamorphic effect upon invaded rocks than corresponding members of the upland assemblage. While granitic and related types appear in lowland dikes and silla, the corresponding occurrences in the upland region are dominantly gabbroic and finer grained rocks of extremely basic composition.

The later instrusives of the lowland area are mostly

dikes intruded along highly inclined or vertical fissures. Those of the upland include both dikes and sills that conform in shape and position to much more complex structural lines of weakness. The superior resistance to erosion of the upland rocks seems to be largely a result of their hardening under igneous influences of these relatively late basic intrusives.

MINERALIZATION

A general feature of rock composition in the Funter Bay area that should be mentioned was first recognized and described by Mertie as follows:

> "All the acidic and intermediate types of intrusive rocks examined by the writer contain albite or oligoclase - albite plagioclase feldspar, and albite is also of common occurrence among the schists and gneisoes. This feature is of more than passing interest when considered in relation to the sodic character of the intrusive rock at the Treadwell mines, on Douglas Island, about 15 miles to the east. It is not unlikely that mineralization at these two localities tock place at the same general period and had a similar origin."
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> (Mertie, J. B. Bull. U.S. Geolo. Survey, No. 714-B., p. 115, 1921)

Other features common to the two districts are frequent occurrence of calcite and quartz together in the same vein; association of ankerite and sphalerite with free gold, and very wide distribution of finely disseminated pyrrhotite and traces or more of

gold throughout rock formation of many different kinds and descriptions, also important differences in mineralization appear, particularly in the occurrence of complex sulphide ore in the Mertie dike at Funter Bay, which has no known counterpart in the Juneau area. The essential facts that seem well established are that both districts have had prolonged and complex histories of igneous activity, and that mineralization in both districts is of deep seated igneous origin and therefore, generally similar as regards possible downward extent.

ORE DEPOSITS

The ore deposits of major interest on the Admiralty-Alaska property are the gold-quartz veins of the lower and upper groups, and a sulphide deposit high up on the mountain that carries nickel, cobalt, copper and some gold. The former are true fissure veins, the strongest standing close to the vertical. The sulphide deposit, known as the Mertie vein is altered basic rock, much veined and impregnated with sulphides, that appears in the natural exposure to have the form of an intrusive sill that dips about 32° eastward beneath the mountain. Similar ore, however, was penetrated by the drill at a point 600 feet almost directly beneath the surface outcrop.

Gold also occurs as already stated, widely disseminated, generally in small quantity throughout most of the local rock formations. Seldom less than a trace, most frequently 20 to 40 cents a ton, and occasionally higher values have been obtained from

practically every kind of rock on the property. Personal sampling by the writer and unquestionable assay procedure thoroughly checks with voluminous assay data of the Company and other investigators bearing upon this aspect of gold occurrence. As yet no commercial deposit of this character has been proved. Higher than average values were obtained, however, from an area of silicified slate southwest of the Heckler workings sufficient to justify further prospecting in that vicinity.

A fourth type of ore occurrence is one of zinc and lead found on the southerly part of the property in laminated quartz ore schist and slate. Layers of the rock in places are heavily impregnated with sphalerite and galena. Occasional narrow lenses of practically pure mineral are to be found. The occurrences examined by the writer were not of minable size.

GOLD-QUARTZ VEINS

Gold-quartz veins of the Admiralty-Alaska property that have been most extensively developed are the Tellurium, Uncle Sam and King Bee veins of the lower group, and the Heckler Blanket vein of the upper group. All of these have been mined to some extent and the ores produced put through the mill. The writer has no data on the tenor or ores milled during the earlier operation of the plant, but is informed that the later mill test results were in line with estimated average values of ore from the different veins as follows:

Vein	Value per ton
Tellurium	$ 30.00
Uncle Sam;;;;	10.00
King Bee	6.00
Heckler	50.00

He is also informed that from 40% to 60% of the gold was recovered on the plates and much of the balance in the form of concentrates.

Tacoma Smelter records of three shipments of concentrates from the Admiralty-Alaska Gold Mining Company in 1926 and 1927 show the following tenors in gold and silver:

Smelter Lot	Gold oz.	Silver oz.
2829	4.32	1.07
2340	4.69	0.74
2340-1/2	11.42	1.63

The average tenor of the concentrates referred to appears to have been about 6.81 oz. of gold and 1.15 oz. of silver to the ton with an average value of about $135.00 to the ton.

The writer has examined voluminous assay records of samples taken from these veins by different investigators. The data indicates as an outstanding characteristic an extreme variability in tenor from sample to sample. Samples taken personally by the writer and assayed under proper control also indicate about the same range of variation. Since the quartz now exposed in the old workings is mostly that rejected in mining it appears that estimate of average tenor should be most reliably based upon records of actual production said to have been at a rate somewhat over $10.00 a ton.

Many veins besides those that have been actually mined occur in both the lowland and upland parts of the property. For the most part development work has stopped short of proving more than authentic fact of their occurrence. To attempt to estimate their average tenors is therefore quite impossible. The assay records applying to them show the same sort of variation as the different samples from the developed veins.

If the average gold content should hold at $10.00 a ton, the gold quartz veins of the property could possibly support a moderate tonnage mining and milling operation. The veins of the lower group may reasonably be expected to persist downward in the same fashion that they do horizontally. Their further development would be a hoisting proposition. Good practice might aim at production of 300 to 500 tons a day.

The Heckler vein as now revealed does not appear to fill a regular fissure that can be counted on to persist for any specific distance. The contorted structure of the adjacent rocks and uneven thickness of its associated trachite dike suggest rather that no dependable estimate of its reserve tonnage can be made ahead of actual development. Free gold is visible in parts of the deposit, other parts give low and nil assay returns. Further development work, preferably by drilling, appears well justified.

The so-called "Big Lode" appears under recent development to be not a regular or continuous vein but rather a succession of large but widely separated bodies of quartz, distributed along the same general line of the Mertie dike. Moreover its sulphide mineral

content resembles the Mertie rather than the proven gold-quartz vein type.

THE MERTIE LODE

The Mertie lode outcrops at the surface at an elevation of about 2000 feet and at a direct distance of about 6000 feet from the Admiralty-Alaska mill. It has been described by Buddington - (Buddington, A. F., U. S. Geol. Survey, Bull. 783-B, p. 46, 1926), as "a dike of troctolite, locally containing disseminations of sulphide blebs." He discusses the mineralogy of the rock as a whole as follows:

> "The dike rock consists of about 55 per cent labradorite, 39 per cent olivine, 4 per cent pyroxene, and 2 per cent magnetite. The magnetite occurs both as minute crystals disseminated in the olivine and as grains interstitial to the pyroxene. The olivine occurs as grains of early crystallization in a ground mass of labradorite with a diabasic texture. The pyroxene is wholly interstitial to the plagioclase. The olivine in places is partly to completely altered to aggregates of serpentine or talc and iron oxides. Carbonate, chlorite, actinolite, and biotite are present locally as secondary minerals. The serpentine and secondary minerals are of later origin than the sulphides. The sulphides form irregular shaped blebs, locally in irregular veinlike forms for half an inch or so, interstitial to the silicate minerals. Generally the sulphides are molded against idimorphic crystal faces of the silicates, but in places they corrode and partly replace the silicates. Magnetite of two generations is present, the older occurring as abundant minute euhedral crystals disseminated throughout the silicates and the younger as larger grains interstitial to the silicates

> or as crystals and grains on the outer borders of the sulphide blebs. Magnetite locally occurs as a group of crystals with perfect borders within the sulphides. In places it shows a little corrosion by the sulphides. Rarely pyrite crystals occur within the sulphide masses but are usually on their outer borders. The magnetite and pyrite were the first metallic minerals to crystallize. A little chalcopyrite is present. It is restricted almost exclusively to the outer borders of the sulphide blebs and assumes elongate narrow shapes, with one side against the silicates and rounded borders against the pyrrhotite. It appears to precede the pyrrhotite and pentlandite. The pentlandite occurs as stringlike veinlets crossing the pyrrhotite and as fringes bordering the pyrrhotite blebs, and has therefore crystallized later than the pyrrhotite. The sulphides, though showing an order of crystallization, are yet essentially contemporaneous and, taken as a whole, belong to a late stage in the consolidation of the dike magma and are themselves of magmatic origin."

Further development work on the Mertie lode after the time of Buddington's examination permitted the writer to observe the bottom of the intrusive mass where it rests upon a finely fissile greenstone schist. The strike of the contact surface as far as exposed dipped easterly about 32° toward the mountain. The upper contact of the igneous body also appears to dip in the same direction beneath a capping of greatly indurated graphitic slate. The structure thus indicated is that of an intrusive sill. Careful estimate of distance from point to point approximately at right angles with indicated dip gave 135 feet as minimum thickness of the mineralized portion of the intrusion.

Northward continuation of the igneous member, for a

short distance at least, is indicated in a test pit about 50 feet from the axis of the discovery, cropping along the cross cutting stream. Beyond this to the north, and also southward from the stream outcrop, bedrock is deeply covered by an apron of talus shed from the towering slate bluffs above. The prominence of the slate scarp seems quite likely due to metamorphic effect of the trocolite intrusion. The bluffs extend both north and south and, for several hundred feet, display about the same extreme degree of induration.

Subsequent to the field examination of the Mertie lode by the writer, referred to above, considerable drilling has been done on it by the Company. The records of this work accord with surface indications that the mineralized body has large cross section dimensions. The core obtained from a down hole at a point some 600 feet beneath the surface outcrop is practically identical in character with that obtained near the surface. These findings are in line with the plutonic origin of the invading magma and normal geologic expectation of downward continuation of the formation along the avenues of its upward migration. A very large tonnage, indeed, of ore not greatly varient in character from level to level would appear definitely indicated to occur in the Mertie deposit.

TENOR OF MERTIE ORE

The assay returns on drill core samples, show values in

gold, silver, nickel, cobalt and copper. The writer is confident that the returns are truly representative for they run in general accord with the variation of sulphide contents of the cores which he examined at the Northwest Testing Laboratory in Seattle, when the first set of assays were run.

From his study of the samples and assay reports the writer has roughly calculated that rock from the Mertie that carries 10% sulphide would have a metalliferous content, considerably higher than the following:

METAL	CONTENT	PRICE	VALUE
Gold	.015 ozs.	$20.00	$ 0.30
Silver	.10 "	.50	0.05
Copper	0.3%	.18	1.08
Nickel	0.5%	.35	3.50
Cobalt	0.12%	2.50	6.00
			$10.93

Upon this basis a concentrate approaching pure sulphide should carry metals worth at least $100.00 a ton. It is believed that rock with less than 10% sulphides rather than more would more truly represent sulphide requirements for $10.00 ore, and that a pure concentrate would run correspondingly higher than $100.00 in metal value at the prices indicated.

Upon the basis of personal experience in flotation mill practice the writer feels confident that a concentrate sufficiently valuable to bear shipping costs can be made by flotation methods from the Mertie ore. In view of the large tonnage indicated for the deposit a thorough investigation of flotation amenability of the ores is more than justified. Should the best concentra-

tion attainable by flotation alone prove too lean for shipment, the tests should be extended to various methods of roasting and smelting.

PROCEDURE SUGGESTED

Under proper schedule of testing and progressive steps of practice, the full possibilities of the Mertie deposit can be developed without material financial risk at any time. The following steps are suggested, each to be taken upon the basis of satisfactory results of those preceding it:

1. Laboratory flotation tests.
2. Standard equipment flotation tests (Government plant at Colorado School of Mines available).
3. Pilot mill. Minimum unit of standard equipment installed in present buildings under power already available.
4. Laboratory smelting tests of concentrates.
5. Standard equipment smelting tests.
6. Complete blocking out of adequate ore reserves.
7. Mine and mill expansion to scale indicated to be most economic in costs of production.

The cost of the earlier steps of such a program would be reduced to a low figure by the facilities and equipment already in place on the property. These include housing, mine buildings, power, equipment for mining, transportation and milling of ores, assay of-

fice, etc. Little, if anything, other than the indicated flotation and smelting equipment would need to be added.

SUMMARY

Gold-bearing quartz veins of moderate size and a sulphide ore deposit of large dimension containing nickel, cobalt, copper and some gold and silver occur on the Admiralty-Alaska property at Funter Bay, Alaska.

The deposits are of deep-seated igneous origin and may be expected to continue downward without material change in character due to increasing depth.

It is believed that the sulphide ores will be found amenable to flotation methods of concentration and that concentrates or material of proper grade for shipment can be produced from them.

Increasing use of nickel and cobalt in certain quality steel products gives a better market outlook for the metals in the Mertie ore than would obtain if the values were more largely in copper and silver.

A schedule of progressive steps of testing and development is presented that is believed to offer extraordinary possibilities of large returns in relation to the capital risks involved.