REPORT

ON

TASSOO IRON

and

COPPER DEPOSITS

Skeena

MINING DIVISION

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R E P O R T

on

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QUEEN CHARLOTTE ISLANDS

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by

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SUMMARY AND CONCLUSIONS:

Deposits of both high grade magnetite and chalcopyrite-bearing magnetite occur within one half-mile of an excellent harbour at Tasu on the west coast of the Queen Charlotte Islands. From surface indications almost certainly no less than 1,000,000 tons of magnetite ore, all of which could be recovered by open-pit mining, is present. In addition, another portion of the magnetite zone contains sufficient chalcopyrite to constitute a copper ore of commercial grade.

Along an irregularly exposed length of 2500 feet, the deposits could contain a total of at least 24,000 tons per vertical foot providing surface interpretation is correct. Assuming a minimum depth of 200 feet, approximately 4,500,000 tons could be outlined. As the ore zone is exposed through a vertical range of 800 feet, there is reason to believe a tonnage well in excess of the above is possible. The copper content at the adit is such that 4 sections in the crosscut adit average 1.5% Cu across a total width of 130'.

Diamond drilling, coupled with surface stripping, is necessary to evaluate, with any degree of certainty, these pyrometasomatic deposits. Present estimates are based on poorly exposed and weathered surface outcrops. However, indications are that this iron deposit may be as large as, or larger than,

any of its type yet encountered in British Columbia.

The following report is based on work carried out by the writer during April and May of 1955, during which field assistance was offered by Pat Russell. Labour was obtained through Albert Jones of Skidegate. A preliminary examination of the property was made by Alex Smith in August, 1954.

LOCATION, ACCESS AND PHYSICAL FEATURES:

The Tassoo Iron and Copper deposits are on the west side of Tasu Harbour, 34 miles due south of Queen Charlotte City. Tasu is a large, well protected "fingered" inlet on the west coast of Moresby Island, in the southern half of the Queen Charlotte Group.

Queen Charlotte City, the largest settlement of the Islands, together with nearby Skidegate Mission, has a population of approximately 500 - mostly fishermen or loggers. Except for off-season employment, little labor is available. With the exception of foodstuffs, Queen Charlotte City should not be relied on for supplies needed for mining. Hotel accommodation is limited.

Tasu may be reached by a six hour boat trip from Queen Charlotte City. As the harbour offers excellent protection from frequently occurring gales, it is often used by fishermen. There is no steamship service to the totally uninhabited west coast of the Island, but fish boats may be chartered locally.

B. C. Airlines service the Islands with a float-

equipped Beaver aircraft based at Alliford Bay. C.P.A. have daily scheduled flights between Vancouver-Sandspit-Prince Rupert. A bus and water taxi operate between Sandspit, Alliford and Queen Charlotte City. Tasu Harbour is a 20 minute flight from Queen Charlotte City.

Logging to date has been on the east coast of Moresby Island. A disconnected network of logging roads, stretching from Sandspit to Pacofi now reaches a point less than three miles from Tasu Harbour. Plans call for completion, in the near future, of this road to Tasu where logging operations would commence. A possibility exists that a through road from Alliford Bay or Sandspit to Pacofi, may be constructed, using existing logging roads for the most part.

A marked variation within the wet, mild climate exists on the Islands with the little-studied west coast being markedly wetter than the east coast where the recorded rainfall is between 55 and 90 inches. An average winter temperature of about 38° F and summer temperature of about 55° F is recorded for Graham Island. Snowfall is relatively light within a few hundred feet of the coast, but increases rapidly above this, and at the higher elevations (2500-3900'), deep snow may remain until late spring or early summer. A distinct tree-line occurs between 2000 and 2500 feet.

Of 21 days spent at Tasu between April 16th and May 13th, 7 clear days and 14 on which rain or snow fell were experienced. In general, summer weather is usually good although widespread fog is reported prevalent.

The Island is heavily forested, chiefly with con-

ifers - spruce, hemlock and yellow cedar predominating. The heavy undergrowth is characteristic of the North Pacific Coast. Most rock outcrops are hidden by heavy moss. Tasu is no exception, although bush-type undergrowth is not locally excessive. Good timber is available on the Tassoo Claims.

Small amounts of water for hydro purposes are possibly available on the Islands. However, because of the narrowness of the southern portion of Moresby Island, rivers are short, and there is no nearby source of hydro-electric power for the Tasu area.

Large lignite reserves are present on Graham Island.

Tasu offers an excellent natural harbour capable of handling the largest of boats. A dock of any desired size, including ore bunkers, plus mill site, could be built within half a mile of the ore deposits.

Except for the caved remains of several cabins near the old Tassoo workings, signs of habitation are totally lacking.

Two suitable townsites are available. The first one, referred to in early reports as the Tassoo Townsite, occupies about 40 acres and is now covered by a mineral claim located by C. M. & S. The second, or alternate townsite, near Blackshale Creek, occupies about 30 acres of the Fee Mineral claim held by St. Eugene. The latter is much closer to the deposit, has better and drier ground and has more sunlight. Docks could be built in the lee of either Horn or Gowing Islands, which would protect them even from the small ground

swells resulting from exceptionally heavy seas in the open Pacific outside the sound.

PROPERTY AND OWNERSHIP:

Except for coastal margins near Skidegate Channel, and sections of the east coast, Moresby Island has not been mapped geologically, and only a few reports of examining mining engineers and geologists are available.

Earliest work recorded in the Tasu area was about 1907-1909. A group of 17 claims was prospected under bond by the Tassoo Mining and Smelting Co.Ltd., with the operations under the direction of F.C.Elliott of Revelstoke, B.C. In 1913 the property was optioned to R.R.Hedley and Associates of Vancouver. Considerable work was done on the southern portion of the Tassoo claim where a copper-rich section of magnetite was the center of interest. A 300 foot adit containing a 40 foot winze was completed and surface stripping and trenching carried out. A number of short adits or pits were put in on the magnetite zone at the north end of the Tassoo claims, apparently to explore copper stains seen on the surface. By 1914, a Crawford type Aerial tramway was installed and a 1200 ton capacity bunker was built on the beach. A second adit was driven but was stopped before reaching the ore zone. 1100 tons of iron-copper ore was shipped to Tacoma. Small shipments were made in 1916, and 400 tons was reported shipped by T. E. Young in 1917 before the mine was forced to close by adverse economic conditions caused by the war. 24 of the claims were Crown-granted in 1914.

The Warwick and Tassoo Crown Grants were purchased

by St. Eugene at a Sheriff's sale in 1953. Six adjoining locations, known as the "Jones Group", were purchased in 1955 from Albert Jones of Skidegate Mission. Much of the Jones Group unknowingly covered ground of the Crown-grants, and as key areas apparently were left open by the Jones staking, one full size and four fractional locations were made by us this spring, with the understanding that the fractions would be treated as part of the Jones Group.

During 1953 and 1954 the area, at least along the coast, was actively prospected for copper-iron deposits by C.M. & S. prospectors. A large number of locations were made, partly with the expectation of obtaining the Warwick-Tassoo Crown-grants. Only one claim was recorded, the "Garnet #4", on which a small copper-magnetite deposit was uncovered. It is of interest only because it also covers the whole of the original Tassoo Townsite. Five years assessment work were recorded by C.M.& S. on this claim.

During the survey of the area, several claim posts were found far from their originally surveyed positions. In other cases key posts were represented by several possible alternate posts, none of which satisfy too accurately their plotted positions. Thus, until a complete survey is done by a qualified surveyor, claim locations should be considered approximate only.

GENERAL GEOLOGY: (See Map T2).

Except for shore line, creek cuts, and mountain tops, little rock is exposed. Only a rapid examination was made of the surrounding area.

The oldest rocks are probably the thin-bedded

black shales and argillites as exposed on Gowing Island. These appear to be overlain by a group of andesitic volcanics and interbedded meta-sediments which is in turn overlain by limestone (marble) of unknown thickness. A mass of related andesitic and basaltic dykes cut the older rocks. Granitic rock, approximating quartz-diorite in composition, but varying widely in texture intrudes the shales volcanics and limestones.

The granitic rock may be quite widespread in the Tasu area, but its irregularity makes it difficult to outline.

The age of the rocks is unknown. However, in keeping with rocks mapped on the rest of the Island Group, they are probably mesozoic.

Calcareous members have been metamorphosed to marble or skarn. Horn Island, itself a resistant metamorphosed remnant, is practically joined to the mainland by a resistant narrow band of skarn and marble. This band was caused by a dyke-like intrusive of andesite, which grades outward in grain size from a marked chilled contact to a rock approaching finer-grained phases of the quarts-diorite.

Attitudes indicate the structure to be complicated by folding. From the few attitudes shown on Map T2, it could be interpreted as a northwesterly plunging anticline with Gowing Island and the magnetite zone on opposing limbs and Horn Island the nose. Regional study of airphotos, together with limited ground observation, indicated a series of strong, northwesterly breaks or scarps which might be interpreted as strike faults. These were not studied locally but it is quite evident from the photos that the magnetite zone closely parallels the better defined of these breaks (See photo 3).

LODE DEPOSITS: I MAGNETITE

GEOLOGY: (See Map T3)

Rock units encountered near the deposit are described as the Upper, Middle, and Lower Groups. They have not been mapped in detail.

The Upper Group, which overlies the ore zone, consists of white, crystalline, limestone (marble), and may include minor skarn bands. Andesite and basalt dykes occur infrequently. Total thickness is unknown but, as exposed in Jones Creek, is at least 200 feet.

The Middle Group is defined as consisting largely of andesitic volcanics, which may be brecciated in part, and minor interbedded meta-sediments, chiefly skarn. It is cut by a swarm of basalt, andesite, and dacite dykes which are often more in evidence than the rocks they intrude. Near the Tasseo workings several conspicuous types occur, including a coarse trachyte and a finer-grained dark rock termed diabase in earlier reports. Hornblende Porphyrite was a name commonly given to these rocks by G.M.Dawson and McConnel. Thickness is unknown although more than 600 feet is exposed in Jones Creek.

The Lower Group consists of medium-grained granitic rocks with the general composition of quartz-diorite. These outcrop in Tram Creek and along the beach. Textural changes, especially finer-grained phases, are common. Biotite is usually lacking and the rock often shows a distinct greenish tinge caused by augite and alteration amphibole. Dark dykes, probably basalt, occur sparingly. The contact with other rocks was not seen locally, but dyke or sill offshoots elsewhere indicate

a distinct intrusive origin.

The magnetite occurs along or near the contact of Upper and Middle Group rocks. The deposits are pyrometasomatic in origin and have replaced members of both groups. The skarn zones have probably been the most favorable. A short distance beyond the Tassoo boundary a "branch" occurs in the magnetite zone. In this zone, termed the "T-BONE", the Lower branch appears to cut across the Middle Group rocks.

The upper limestone contact-type magnetite, except in the wider portions, contains small amounts of sulphides, chiefly pyrite. Pyrrhotite has been reported. Native copper and malachite can be seen in restricted areas near the lower contact, and large fragments of unreplaced but highly altered epidotised country rock occur at intervals. In general, the wider the zone, the purer the magnetite. However, as an exception, the wider zone near the south end of the Tassoo claim contains the copper deposit of interest.

The Lower T-Bone magnetite, where exposed, is very pure. However, areas of only partially replaced country rock and unmineralised dyke rock are believed present within the magnetite zone as mapped. Small amounts of pyrite have been found near the lower contact of this body. The Lower T-Bone deposit is believed to contain the largest and richest magnetite reserves.

Structurally the deposits are more complicated than is immediately apparent. A distinct westerly dip of 45° to 70° is indicated by skarn bands. The magnetite of both zones conforms to this in general although variations occur.

Ore control is not apparent for the lower zone. Unlike the upper zone which follows conformably the limestone contact, the lower zone appears to cut across the regional trend of the Middle Group rocks. Nevertheless, it is conformable in the several areas where its contacts are exposed. Thus cross or superimposed folding may be an important control.

DEVELOPMENT:

Except for several small cuts and adits put in on the upper magnetite zone (apparently in the search for copper) no work has been done on the iron deposits.

Stripping and shallow trenching were done on the T-Bone deposit this spring.

ASSAYS AND RESERVES:

No attempt was made to sample the magnetite as the result based on the limited exposures would not be representative.

Most outcrop and float observed in the T-Bone deposit contains at least 90% magnetite. Several small sections in poorly exposed portions contain 50% unreplaced rock, chiefly epidotized volcanics and skarn. Sulphides are no problem in the richer areas although they may have been weathered out of much of the rock seen. The amounts of pyrite seems to increase with a narrowing of the mineralized ores. A fresh sample of the T-Bone magnetite assayed: Fe 67.6%, S less than 0.01%, P 0.003%, Cu less than 0.05%, SiO_2 2.08%, Al_2O_3 2.10% and TiO_2 less than 0.1%. Smelter returns of the copper-iron ores showed 62% iron.

Magnetite zones as outlined on Map T3 were determined

by sparse outcrop, float, and dip needle. As the deposits cut diagonally across a steep hillside, dip needle readings, as well as the presence of even coarse float, may be misleading in many cases. However, there are enough solid exposures, partly exposed by stripping, to indicate dimensions of the order shown.

The lower T-Bone deposit is exposed 700 feet horizontally through a vertical range of 300 feet. An average true width of 120 feet is indicated. Calculating using maximum dip of 70°, and a tonnage factor of 9, approximately 9,350 tons per vertical foot (/Vft.) is indicated. Similarly the upper T-Bone, along 400 feet with an average width of 100 feet, would have 4500 tons /Vft. This figure will be increased where the dip is less than 70°. The copper-magnetite deposit should approximate at least 3300 tons/Vft. As the whole magnetite zone is exposed through a vertical range of 800 feet, a conservative minimum depth expectancy of 200 feet for these mapped or partially mapped deposits would indicate about 3,430,000 tons.

In addition, relative estimations of three unmapped extensions indicate an additional 7000 tons/Vft. increasing the total of possible ore to 24,150 tons/Vft. or 4,830,000 tons to 200 feet.

A large portion of this ore could be extracted by open-pit mining. The T-Bone deposit appears especially suited for such operations and at least 1,000,000 tons of high grade magnetite could be recovered by this method.

OUTLOOK:

Tassoo offers promise of being one of the larger high grade magnetite deposits on the west coast. Copper may be

profitably recovered from the same deposit if tonnage exists.

II COPPER-MAGNETITE DEPOSIT

GEOLOGY:

The copper-magnetite deposit is located along the southern section of the contact-magnetite zone. The area has not been mapped geologically except in the immediate vicinity of the old workings (See map T4).

The deposit occurs as a widening in the magnetite zone similar to the bulge of the upper T-Zone. Chalcopyrite mineralisation, disseminated quite uniformly through the magnetite, is the main copper mineral. The geologic controls and extent of the ore zone are not known. A number of steeply dipping (diabase?) dykes, along with unreplaced country rock, occur in an adit driven across the deposit for mining purposes.

The body is believed to dip westerly as indicated by other deposits. A lower adit, driven below the first one, was designed to crosscut the ore zone. It stopped at a point almost immediately below the portal of the upper adit without encountering the magnetite, proving the dip is not easterly.

The deposit is shown to be at least 200(?) feet wide and to have a vertical range in excess of 100 feet. It is exposed along strike for at least 300 feet, but narrows rapidly beyond this. It is not known whether this whole bulge contains copper of ore grade or not as surface exposures have been leached.

ASSAYS & RESERVES:

The upper adit collars in ore and crosscuts the

deposit for a distance of nearly 280'. Of this 130' is copper-bearing magnetite, 25 feet limestone, and the balance of 125' is diabase, greenstone, or skarn. The bulk of the ore occurs in 4 sections (see Map T5).

	Hedley's 1911 Channel Sampling		Smith's 1954 Chip Sampling		
	W	Cu	W	Cu	Fe
	28'	1.65	36'	1.6	64.6
	34'	2.10	32'	1.0	66.0
	33'	1.68	33'	1.9	62.
	18'	2.61	18'	0.9	60.2
Total	130'	1.9%	119'	1.43	63.6%

An arithmetic average of 9 channel samples taken by C.C.Starr in 1953 across these same widths is 1.28% Cu and 60.6% Fe.

RECOMMENDATIONS:

Ore reserves beyond the 1,000,000 tons reasonably indicated through surface expressions can only be proven by an adequate programme of diamond drilling and stripping. For this to be efficient in this area of heavy timber and overburden, the use of a heavy duty bulldozer early in such a programme is highly recommended.

Drilling should be planned in two stages. The first stage, which would involve a minimum amount of drilling per ton involved, would block out "open-pit" ore and provide needed geological information on which to base the second longer range "underground" ore stage. Spaced set-ups can conveniently be made a short distance back of the hanging-wall of all deposits, particularly the T-Bone. Two holes from each set-up are war-

ranted, especially if a dip of 45° to 70° holds true. The first should be inclined 40° downward across the ore zone, and the second vertical. #1 hole will probably not exceed 150'. The length of #2 hole will vary depending on dip but should be less than 250'. Five stations at 100 foot intervals on the lower T-Bone could outline 1,500,000 tons providing structure holds. If the deposit proves erratic, closer spaced drilling will be necessary. A minimum of 3000 feet is required.

Similarly a minimum of 3000 feet is required to outline 800,000 tons of open-pit ore on the upper T-Bone.

Testing of the Tassoo copper-iron property can be undertaken in the same manner as the T-Bone, but much closer spaced drilling is required due to the uncertainty of the copper distribution. Drilling from the hanging-wall at 50' intervals, 500' of drilling from 6 stations could outline 800,000 tons of magnetite-bearing material. Recovering the copper as a by-product (assuming it to be widespread in the body) a large part of this tonnage could be mined by open-pitting. (however, this method would not be selective enough, due to the tyke and country rock content to obtain ore of the grade previously shipped). Several thousand feet of drilling will be necessary to outline a commercial copper body.

Bulldozer stripping should be employed throughout the zone, especially on the lower T-Bone extension and at several points on the Tassoo claim where excessive float indicates sizeable orebodies. Information gained through drilling elsewhere could then be used to evaluate these deposits.

A bulldozer road, not over 1 mile in length, pre-

ferably starting from the beach in the vicinity of the Feo claim, could obtain the best and most advantageous route by closely following the mineralized zone to a point 50 feet above the Tassoo workings. Little or no rock work would be required.

With a good operator, 3 weeks work with a suitable machine should be ample. A private contractor living in Queen Charlotte City could probably supply a D8 Cat and barge, but nothing definite is known to this effect at present.

The cost of such a programme has not been accurately determined and comparative work has not been done in the Queen Charlottes. 8000' of drilling at Zeballos outlined 1,000,000 tons of comparable grade magnetite at a cost of approximately $56,000.(??) or $7/ft. Costs at Tasu should not exceed this. Thus 3,000,000 tons of likely open-pit magnetite and copper-magnetite (with a potential value of $45,000,000.) could be outlined by 12,000' of diamond drilling at an overall(?) cost no greater than $84,000. Additional expenses, including bulldozing, may raise the total to $100,000. (Expenditures to date, including purchase of all property do not exceed $5000.). Except for guaranteed drilling assignments, which can be arranged separately, the programme will be progressive, and if at any point it appears that the possibilities of the area have been greatly overestimated, outlay can be reduced.

A properly qualified land surveyor (B.C.L.S.) should be employed to establish legal claim boundaries. The potential value of these claims is such that they should be held indefinitely, and a survey will be needed for Crown-granting in several years. It can apply as current assessment work. At least one of Jones claims, if properly surveyed, may be shown to be wholly on

the Tassoo Crown-Grant. If the iron deposits are to be mined, it must be remembered that the iron ore cannot be shipped from the Jones Group without a permit from the B. C. Government. This is not so on the Tassoo claim which is owned outright by Frobisher, and is exempt from this government regulation. As stated previously, the exact location of the Tassoo-Jones Group boundary, which cuts across the important T-Bone iron deposit, is in doubt, and can only be determined by proper survey. A Royalty of 25 cents per ton is payable to Albert Jones and Associates on the first 1,000,000 tons mined from the Jones claims.

The Ella and China Boy Crown-grants should be purchased and several additional fractions located before any announcements of proposed work are made.

Prospecting should be carried out along the magnetite zone to the south as mineralized float has been found in several creeks cutting this area. Lack of copper values may have prevented prospecting here in the past.

Except for this recommended surveying and prospecting, further small scale exploration programmes such as those coupled with assessment work can be of no further use in evaluating this deposit. It is the opinion of the several who have been on this property that, if iron ore is wanted on the west coast, as it certainly will be in the future, a programme such as that outlined in this report is warranted. Definite plans must be made during the winter in order to make preparations for late spring and summer work, especially in an area as remote as the Queen Charlottes.

A P P E N D I X (1)

GENERAL DESCRIPTION - TASU AREA ROCKS:

(1) - Medium-grained quartz-diorite outcropping in slide area across from Tasu Camp (Section 545):

Feldspar	-	70%, chiefly andesine (An40)
Quartz	-	10%
Hornblende	-	15%
Other mafics	-	5%

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(2) - Greenish-gray, granular textured andesite dyke rock constituting eastern side of Horn Island (Section 544):

Feldspar	-	30%, chiefly andesine (An35)
Quartz	-	10%
Augite	-	45%
Other Mafics	-	Alteration amphibole 15%

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(3) - Fine-grained, reddish-brown weathering basalt dykes, occurring near magnetite zone (Sections 546, 550):

Feldspar	-	40% labradorite (An55)
Augite	-	50%

Alteration amphibole, chlorite(?), etc. 10%

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(4) - Light, porphyritic "porcelain" textured dacite dyke rock occurring near T-Bone zone (Section 547):

Feldspar	-	60% Andesine (An32) - 5% as phenocrysts.
Quartz	-	5% (chiefly as phenocrysts).
Mafics	-	15% - include light colored mineral with optical properties of hornite.
Pyrite	-	3%, as well formed cubes, partial kaolinisation(?). Remainder limonite through staining.

Rock difficult to classify due to exaggerated appearance of minor quartz. Probably a dacite.

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(5) - Highly altered rocks outcropping below T-Bone deposit:

(a) Section 543. Grayish volcanic rock - may be altered, pyroclastic, coarse-grained basalt:

Feldspar - 35% - labradorite (An50) - as coarse phenocrysts in altered feldspathic groundmass.

Mafics - 55% - largely augite partially altered to tremolite, chlorite, etc. Slight epidote.

Remainder carbonate and opaque material.

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(6) - Section 549 - Grayish fine-grained porphyritic volcanic rock - appearance of an andesite but composition of a basalt, depending on classification used:

Feldspar - 50% - Labradorite (An55)
Augite - 10%

Remainder alteration amphibole and carbonate.

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(7) - Section 548 - Altered, light-grayish, grained volcanic rock similar to #549:

Feldspar - (60%) labradorite (An55)
Quartz - (2%)
Augite 20%

Remainder alteration amphiboles, etc.

A P P E N D I X (2)

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(3) - Geological Survey Map 278A.

(4) - G. M. Dawson - G. S. C. Report 1880.

(5) - R. G. McConnell - G. S. C. Sum. Rept. 1909.

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