2503

REPORT OF GEOLOGICAL AND GEOPHYSICAL SURVEYS,

JIM #1 - #22 MINERAL CLAIMS OF THE JIM CLAIM GROUP

UNUK RIVER AREA, 56°N, 130°W,

SKEENA MINING DIVISION, B.C.

BY

Erik A. Ostensoe, Chief Geologist,

Peter A. Brown, Geologist.

FOR

Granduc Mines, Limited, (N.P.L.)

May 31 - September 2, 1969.

TABLE OF CONTENTS

INTRODUCTION	page 1
GENERAL GEOLOGY	2
DETAILED GEOLOGY	2
ZONE OF ALTERATION	6
STRUCTURAL GEOLOGY	6
MAGNETIC SURVEYS	7

CERTIFICATE OF QUALIFICATION

APPENDIX 1 - Statement of Employees and Qualifications

ILLUSTRATIONS (in rear pocket)

#1 Figure 1 - Location Sketch
#2 Figure 2 - Geology Plan
#3 Figure 3 - Magnetic Survey

INTRODUCTION

This report and the accompanying maps present details of line-cutting, geological surveys and magnetometer surveys on the Jim #1 to #22 mineral claims. The claims are owned by Granduc Mines, Limited (N.P.L.) and all field work was performed by employees of that company in the period May 31 - September 2, 1969. Due to difficult and dangerous terrain, only a small amount of work was done on Jim #9 and Jim #16 claims.

The location of the claims is given in Figure 1. The area is south of Unuk River, from 2 to 5 miles north-east of the U.S.A./ Canada border and 40 miles north north-west of Stewart, B.C. The topography in the area is generally steep and forest cover below 3,500 feet elevation is dense, mostly mature hemlock trees with patches of slide alder. Above 3,500 feet elevation, trees are sparse. Streams are steep and incised.

15,000 feet of baselines on bearing N41^{o}E and 39,000 feet of cross lines on bearing N49^{o}W were slashed, chained and marked as a rectilinear grid for geological mapping and magnetic surveys. Geological mapping on the scale of 1 inch equals 300 feet was carried out by Peter A. Brown, Geologist, (B.Sc. Aberdeen), and the magnetic observations were recorded wherever possible by Daniel Cowan, (B.Sc. Western Ontario), using a McPhar M-700 vertical field fluxgate-type magnetometer. Erik A. Ostensoe, Chief Geologist, Granduc Mines, Limited (N.P.L.) organised and supervised the field work and assisted in mapping. This report was prepared by Ostensoe and in part was compiled from a thesis submitted by Brown in partial fulfilment of the requirements of an Honors B.Sc. program at the University of Aberdeen, Aberdeen, Scotland. Dependence upon and free use of Brown's field and laboratory data, is gratefully acknowledged but except as noted, the conclusions are those of E.A. Ostensoe.

Various Granduc employees were employed in this work during June, July and August, 1969, for a total of 220 man days, (Appendix 1.). Camps were moved and serviced by a Stewart based Bell 47-G3B1 helicopter and a total of 24 hours 30 minutes of flying was required.

GENERAL GEOLOGY

The Jim #1 to #22 claims lie from 1 to 5 miles east of the granitic Coast Intrusions. Mezozoic age volcanic, pyroclastic and, to a lesser extent, purely sedimentary rocks are present, along with a variety of intrusive rock types (Figure 2.). Effects of regional metamorphism are widespread but vary greatly in intensity. Structures appear to be relatively simple and few were mapped. Although not indicated in detail in Figure 2, the northwestern-most part of the claim group is criss-crossed by innumerable shallow but sharply defined linear valleys that are thought to reflect joint patterns and minor faults.

The Max iron-copper deposit, situated four miles northeast of the north end of the Jim #1 to #22 claims is the only mineral deposit of consequence known in the lower Unuk River area. Massive magnetite with copper and iron sulfides and a suite of tactite minerals including epidote, garnet and diopside, occurs at a folded contact between a linestone-andesite section and diorite.

Although the Coast Intrusions are known to be located close to the southern limit of the claim group, evidence of disruption and metamorphism consequent upon the emplacement of the Coast Intrusions is slight. Laboratory and field evidence of regional metamorphism includes the amphibolite facies mineral suite developed in the andesitic volcanics and a regional schistosity. Solely on the basis of known ages of rocks in nearby parts of the Unuk River area, it is assumed that all rocks discussed in this report were emplaced in Middle Mezozoic time.

DETAILED GEOLOGY

The geology of the Jim #1 to #22 claims is given in Figure 2. This section of the report will briefly describe the major rock types present: greenstone, tuff, lime-shale sequence, porphyry, diorite, amphibolite and granodiorite. An alteration zone located on Jim #17 claim will also be described.

Greenstone

The greenstone varies from light green to dark green and the latter colour is characteristic. The grain size, which varies from fine to medium, presumably reflects both original lithology and subsequent recrystallization in the greenshift facies and, as described later, in the amphibolite facies. Original textures and structures have been obliterated by recrystallization. Feldspars are porphyritic with respect to a fine-grained quartz-rich groundmass. Epidotization and saussuritization of feldspars is ubiquitous and precludes more precise identification of feldspar types, although both orthoclase and plagioclase were reported by Brown. Two species of amphibole were identified in thin section by Brown: actinolite and iron-rich actinolite. In hand speciman, mafic grains are merely identifiable as amphibole laths and are up to 2 mm. in length and exceptionally up to 10 mm. in length. Accessory minerals include magnetite, pyrrhotite and chlorite.

The abundance of this rock type and its mineral assemblage suggests that it represents an extensive and thick section of andesitic lavas that has undergone retrograde metamorphism with development of chlorite, epidote and saussurite. Recrystallization has occurred: in particular, the quartz rich ground mass was probably originally a volcanic glass.

Associated with and for mapping purposes included with the greenstone unit, is a streaked phase of the greenstone that exhibits discontinuous layering of dark and light bands. The light bands are principally feldspar and/or quartz; the dark, actinolite and epidote. The bulk composition of the streaked phase probably approximates that of the massive greenstone and no explanation of the texture is offered.

Tuffs

Fine grained irregularly and discontinuously banded dark green rocks that are assumed to be pyroclastic in origin were mapped as tuffs. Regional metamorphism has obliterated minor structures but bedding attitudes can frequently be obtained. Brown's thin section studies did not illuminate the petrology of the rocks, other than by determining that the major components are volcanic "dust" and very fine grained magnetite. Quartz and plagioclase phenocrysts are present but are not abundant. As is the "greenstone" unit, the tuff is andesitic in composition.

Lime-Shale Sequence

The lime-shale sequence occurs mainly in the north and north-eastern portion of the Jim claims. The rocks are thinly but prominently banded and consist of alternating layers of impure grey limestone, greywacke and black shale. Individual bands are generally less than 1 cm. in width. Slickensides and small scale drag folds are abundant in this formation. The rock is relatively weak and its distribution may be considerably greater than indicated by outcrop mapping.

Porphyry

Several porphyritic dykes were mapped in the Jim claims area. In hand specimen these typically exhibit a glassy black matrix and moderately coarse phenocrysts of feldspar and quartz. Thin section examination revealed that phenocrysts are strained and altered and that the groundmass consists of glass with minute laths of feldspar and biotite and idiomorphic crystals of magnetite and quartz. Flow textures are indicated by the alignment of laths.

Diorite

The diorite mapped on the Jim Claims is quite variable in appearance but in general is similar to but coarser-grained than the greenstone and it seems probable that these rock types are related: the diorite may be the hypabyssal equivalent of the greenstone or may in some cases represent feeders to the extrusive rocks. The broad band of diorite shown west of the lake in Figure 2 is markedly heterogeneous whereas the occurrence north of the lake is less so.

The following mineral descriptions are based on Brown's thin section study of diorites. The main constituent is plagioclase, perthitic or strongly and normally zoned. Biotite occurs as laths, generally without foliation. The lack of large idiomorphic crystals suggests an igneous origin. Chloritisation due to retrograde metamorphism is widespread. Quartz occurs interstitially with the feldspar crystals. Accessory minerals reported include apatite, sphene and magnetite. The latter mineral occurs in proportions up to 10 per cent of the total rock and may be responsible for wide variances in magnetic succeptibilities. Basaltic hornblende was reported from one small hornblende diorite dyke. In that case at least colorless areas within the hornblende crystals are remnants of augite grains, implying that the hornblende is secondary.

The variety of diorite types encountered is probably typical of that found in most areas adjacent to the Coast Intrusions and is likely a consequence of both assimilation of country rocks, and fractionation of magmatic phases of the parent material.

Amphibolite

Amphibolite is prominent throughout that part of the Jim #1 to #22 claims that lies southwest and west of the small lake, (Figure 2). Although some amphibolite is thought to occur in dykes, most of the rocks included in this unit are thought to be of metamorphic origin, having been derived from the greenstone.

Thin section studies by Brown indicate that two amphibolites are present: derived from pyroxenite and derived from greenstone. The former is characterised by remnants of idiomorphic augite phenocrysts that have been partially uralitized. Magnetite occurs in interstices of the augite crystals and may constitute a few per cent of the rock. In contrast, amphibolite derived from greenstone is schistose and largely consists of actinolite and feldspar. Ferroactinolite occuring as small matted needles determines the schistosity and in thin section is seen to be overgrown on and independent of the extensively sericitized feldspar (possibly orthoclase). This texture is convincingly indicative of the metamorphic development of ferroactinolite in the amphibolite derived from porphyritic greenstone.

Granodiorite

One granodiorite dyke about 100 feet in width was mapped on Jim #20 claim. The occurrence is a coarse-grained, light coloured holocrystalline rock with rounded basic xenoliths. The main mineral constituents are potash feldspar, plagioclase and hornblende with magnetite present in accessory amounts. Inclusions are similar but contain greater amounts of hornblende and magnetite.

This particular granodiorite dyke is thought to be a typical member of the suite of dykes found in the border zone of the Coast Intrusions.

ZONE OF ALTERATION

An altered zone occurs in the Jim #17 to #22 claim section of the property and tends to be sporadic in occurrence. It usually conforms to the dip and strike of enclosing beds but does exhibit minor independent fluctuations.

In most cases the host rock is tuff and it is possible but not proven that the alteration is restricted to one horizon within the tuff-greenstone sequence. The alteration consists mainly of epidotization with associated skarn-type minerals, including garnet and minor amounts of oxides. Magnetite, pyrite and chalcopyrite occur within the alteration zone.

STRUCTURAL GEOLOGY

In general, the structural geology of the Jim claims area is simple. A primary northeasterly-trending regional structural "grain" appears to have been overprinted by a weak thermal effect and by a secondary regional metamorphic "grain", possibly related to the development and emplacement of the nearby Coast Intrusions. Although no wholly distinctive thermal metamorphic mineral suites were recognised, Brown's study of the assemblages suggests an overlapping, or telescoping, of late event thermal effects.

Locally, metamorphic suites may have been upgraded by the effects of faulting and shearing which may have supplied activiation energy to promote otherwise sluggish reactions. Occurrences of amphibolite (with magnetite) in areas of greenschist facies assemblages are cited as examples.

Sharply defined lineaments with north-south and northeast-southwest trends, probably reflecting a complex system of minor faults and joints, are especially abundant in the northwest portion of the Jim #1 to #22 claims area, in particular west of the small lake. The major canyon that occupies most of Jim #16 claim in on strike of the north-south group of lineaments and suggests that one or more through-going north-south fault structures is present.

Lack of outcrops and, in particular, lack of marker horizons, prevented precise determination of fold structures. An easterly-plunging anticline is indicated in the area of Jim #17 and #19 claims. This proposed structure has not been satisfactorily related to the regional geology.

MAGNETIC SURVEYS

In 1968 magnetometer surveys conducted by Seigel Associates Ltd., Vancouver, B.C., using a Newmont type NPM-1 nuclear resonance total intensity helicopter borne magnetometer system revealed an arcuate pattern of anomalously high magnetic susceptibilities passing approximately through the Jim #1 to #15 claims and a second pronounced magnetic high in the area of Jim #17 to #22 claims. Ground surveys with readings at 100 foot intervals were conducted on the Jim #1 to #22 claims grid in July and August, 1969 to substantiate the airborne survey data and to help explain the anomalies. A McPhar M-700 vertical field fluxgate-type reading magnetometer was employed. This instrument has a readability of about 5 gammas in the 1000 gamma range. Repeatability is somewhat less giving an effective readability of perhaps 10 to 20 gammas. Check readings were taken periodically at stations on the baseline and at least twice daily at the base station. Results were plotted and contoured by hand using the generally accepted methods (Figure 3).

In most respects the magnetic surveys were compatible with the geology as mapped. The broad airborne magnetic "high" on Jim #1 to #15 claims was found to break down in detailed survey to a scattering of sharp random high readings (more than ten times background) amid contrasting lows. Where outcrops were found close to "high" readings, a direct relationship between "highs" and magnetite-bearing amphibolite or diorite could be proven.

A relationship exists between magnetic susceptibility, rock types and the north-south and northeast-southwest striking linear structures. Host rocks of andesitic composition have been regionally metamorphosed to greenschist and, locally, where sheared, to amphibolite facies rocks. In the latter case, magnetite was released concommitent with the formation of actinolite.

In the Jim #17 to #22 claims area, sharp magnetic "highs" were located southwest of the baseline. These anomalous readings may be related to non-outcropping concentrations of magnetite or to magnetite-rich andesitic volcanic rocks. Rocks answering that description were mapped on Lines 95 and 100. Further studies are planned.

Erik A. Ostensoe.

ERIK A. OSTENSOE.

Vancouver, B.C.
June 22, 1970.

CERTIFICATE OF QUALIFICATION

I, Erik A. Ostensoe, certify as follows:

(1) I am a practicing geologist presently employed by Granduc Mines, Limited (N.P.L.).

(2) I am a graduate of the University of British Columbia with degree of Bachelor of Science in Honours Geology. I have completed course work requirements toward a Masters of Science degree in Geology at Queen's University, Kingston, Ontario.

(3) I have practiced my profession in exploration and mining geology for eleven years.

(4) I personally organized and supervised the work reported herein.

Erik A. Ostensoe

Erik A. Ostensoe, Chief Geologist
Granduc Mines, Limited (N.P.L.)

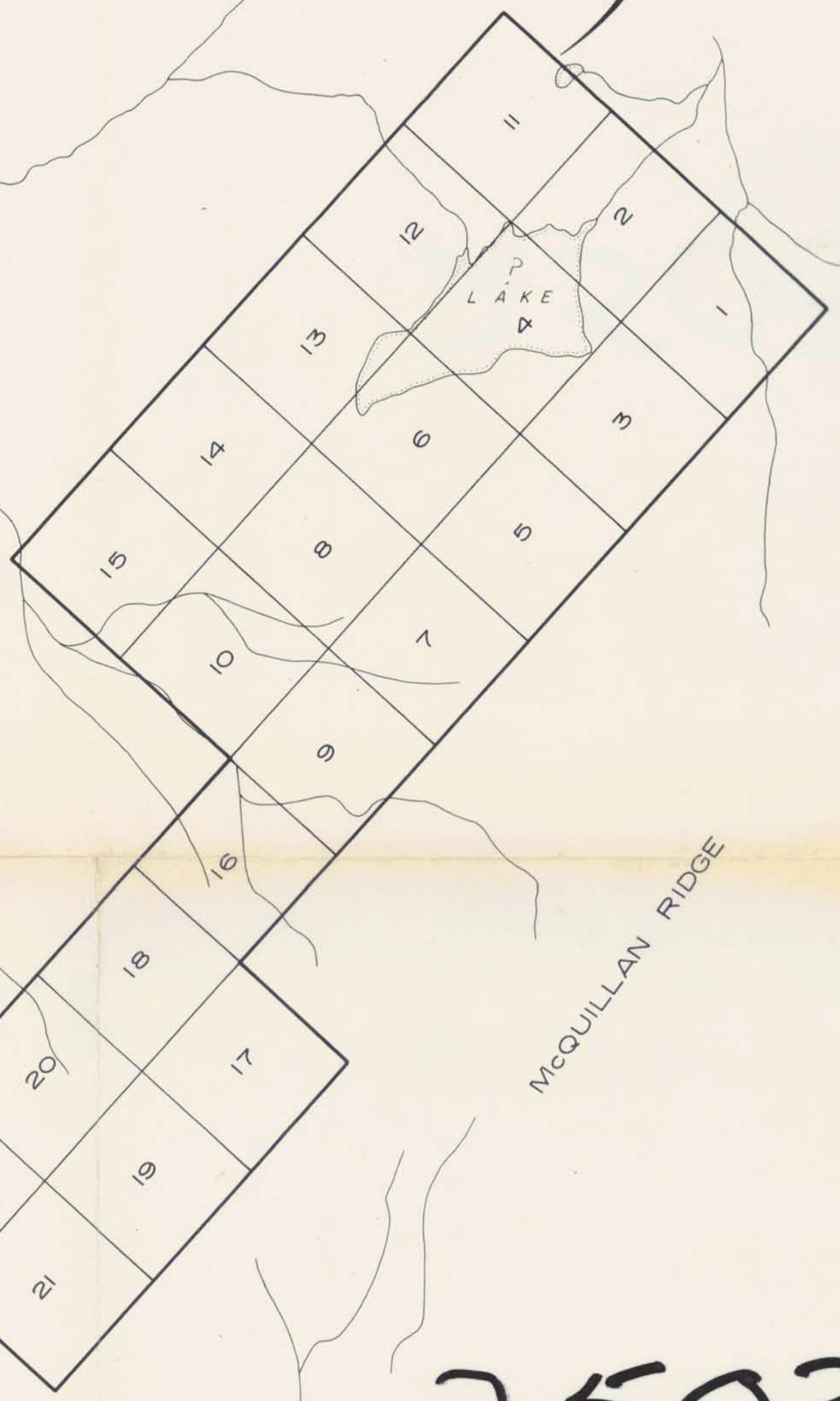
Vancouver, B.C.
June 22, 1970.

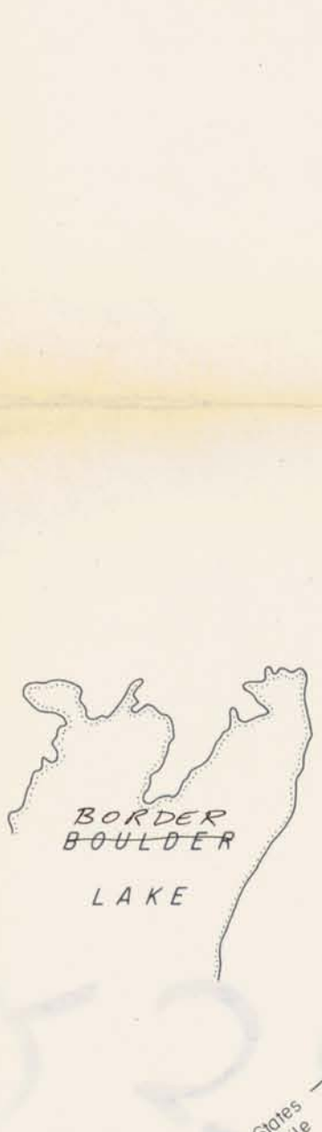
APPENDIX 1.

STATEMENT OF EMPLOYEES AND QUALIFICATIONS

Peter A. Brown	Geologist, 1969 graduate in geology, University of Aberdeen, Aberdeen, Scotland, employed in period June 9 - July 28, 1969, mapping geology of Jim #1 - #22 claims.
Daniel Cowan	Senior assistant, 1968 graduate in science, University of Western Ontario, student in medicine at University of Manitoba, employed in line cutting, and magnetometer surveys in period June 12 - June 29, and August 16 - August 20, 1969. Previous experience in geological fieldwork with Ontario Dept. of Mines, and Granduc Mines, Limited.
David Dunn	Laborer - high school student, employed in line cutting and as geologist's assistant in period July 12 - July 28 and August 16 - August 20, 1969.
Peter Neilans	Assistant - first year engineering student (U.B.C.) employed in line cutting and as geologist's assistant in period June 6 - July 28, 1969. Previous experience in geological, geochemical and geophysical field work in central B.C., and Western Australia.
James Robertson	Assistant - first year engineering student (U.B.C.) employed in line cutting and as geologist's assistant in period June 6 - July 28, 1969.
Erik A. Ostensoe	Geologist - employed as geologist in period June 30 - July 12, 1969. Qualifications as outlined in accompanying certificate.

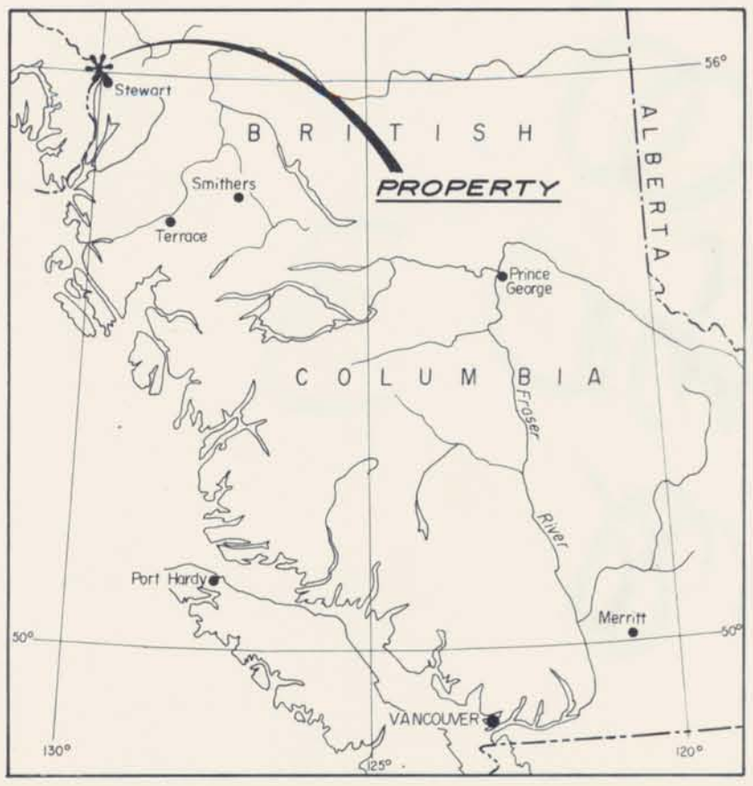
JIM GROUP

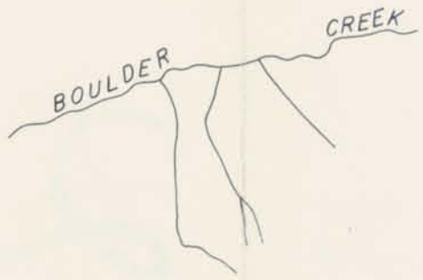




United States border 1 Mile

2503





Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2503 MAP #1

FIG. I.

GRANDUC MINES LTD.

LOCATION SKETCH

JIM CLAIM GROUP 1–22 M.C.'s

UNUK RIVER AREA

SKEENA M.D., B.C.

FEET 1320 660 0 1320 2640 3960 FEET

To accompany report by Brown & Ostensoe

Erik A. Ostensoe

JUNE 22nd. 1970

LEGEND

- 9 "Greenstone", andesite
- 8 Tuff
- 7 Lime - shale sequence
- 6 Limestone
- 5 Amphibolite
- 4 Porphyry
- 3 Diorite, Hornblende diorite
- 2 Granodiorite
- 1 Altered zone

- Contact, inferred contact
- Fault, inferred fault
- Bedding attitude
- Drag fold - showing plunge of axis and inclination of axial plane
- Area of bedrock outcrops (where recorded)
- Campsite

FIG 2

GRANDUC MINES LTD.

GEOLOGY PLAN

JIM CLAIM GROUP 1-22 M.C.'s

UNUK RIVER AREA

SKEENA M.D., B.C.

FEET 300 150 0 300 600 900 1200 1500 FEET

Erik A. Ostenso

To accompany report by Brown & Ostenso JUNE 22nd. 1970

Lake 4

JIM GROUP

BASELINE 1

BASELINE 2

CANYON

CLAIM LOCATION LINE

END OF BASELINE 1

END OF BASELINE 2

Unable to establish this part of line due to cliffs

LEGEND

CONTOUR INTERVAL - 1000 GAMMAS

2503

FIG. 3

GRANDUC MINES LTD

MAGNETIC SURVEY

JIM CLAIM GROUP 1-22 M.C.'s

UNUK RIVER AREA

SKEENA M.D., B.C.

FEET 300 150 0 300 600 900 1200 1500 FEET

To accompany report by Brown & Ostensoe JUNE 22nd. 1970

Erich K. Ostensoe