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BOLIVAR MINING CORPORATION LTD.

SUMMARY REPORT

TOP COPPER PROJECT, ATLIN M.D., B.C.

EXPLORATION ACTIVITIES, 1971

P. F. Lewis

March 1972

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INTRODUCTION

GENERAL

This report summarizes the exploration activities of Bolivar Mining Corporation Ltd. on its optioned Top Copper Prospect, Atlin M.D., British Columbia, during 1971. The activities comprised:

(1) Detailed geological mapping on scales of 1 inch to 200 feet and 1 inch to 500 feet.

(2) An expansion of the 1970 induced polarization survey and magnetometer survey, and presentation of the whole of both surveys on a scale of 1 inch to 500 feet.

(3) An expansion of the 1970 geochemical survey into the southern part of the Property and presentation of the whole survey as above.

(4) Accurate location of the existing claims and grid with respect to topography, and minor further staking and picketing.

(5) Thirty-six hundred feet of diamond drilling, comprising four holes, drilled late in the summer on the basis of the above surveys and mapping.

Items 1 and 2 above will be dealt with in summary fashion as they are the subjects of separate, comprehensive reports by the author and P.E. Walcott and Associates Ltd. respectively (see references).

LOCATION AND ACCESS

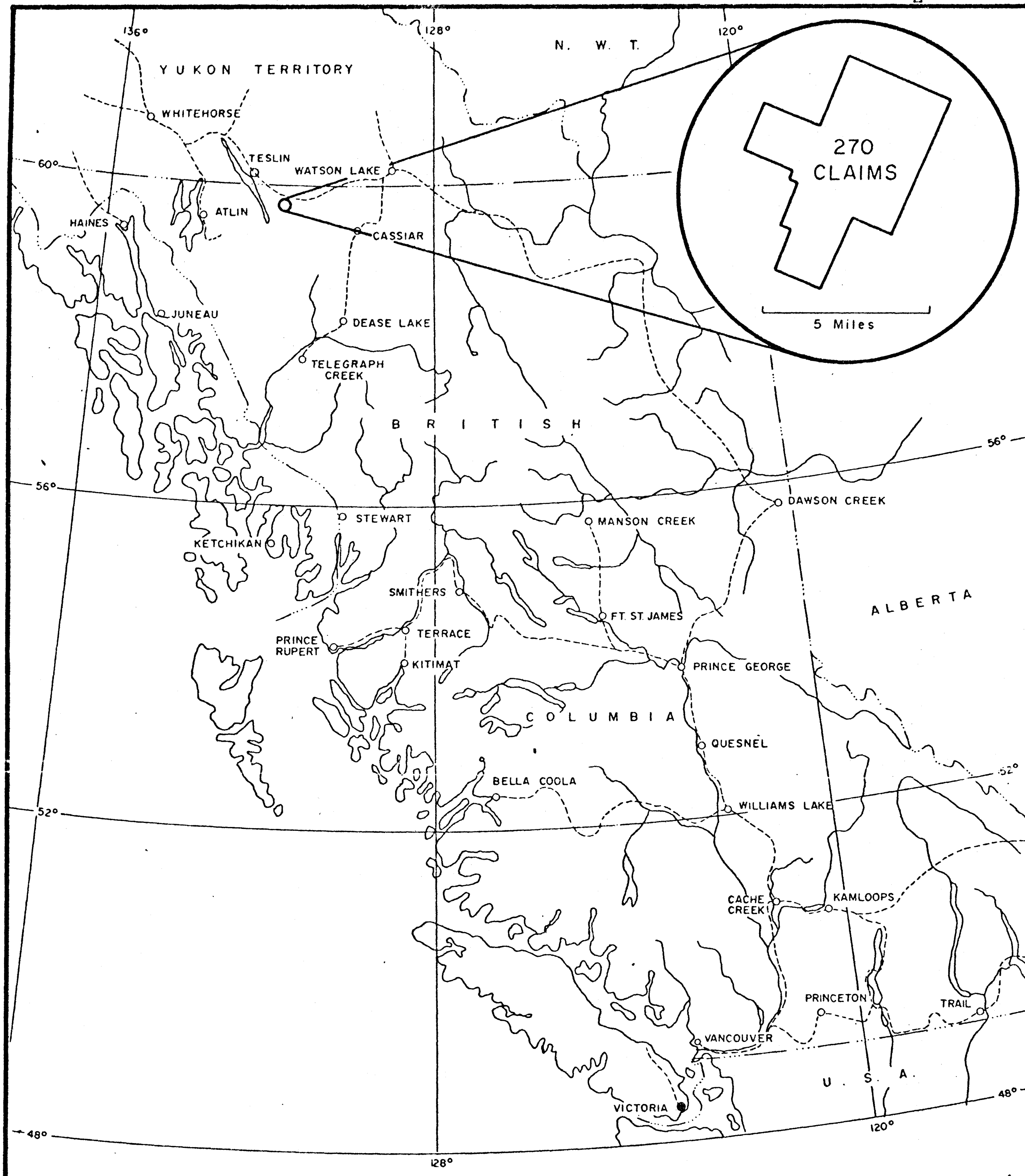
The location of the claim group is shown on the map overleaf.

The Property lies between:

latitudes 59° 45' and 59° 52' N
longitudes 131° 37' and 131° 47' W
and on N.T.S. Sheet 104/O, Jennings River

The northern margin of the claim group is six miles from the Alaska Highway at Mile 753.

Access to the Property from the Highway is by 10.6 miles of dirt road, starting from a gravel pit at Mile 755.5 on the Highway and ending on the northern boundary of the group. A swamp prevents further access by four wheel drive vehicle and during the 1971 field season travel within the Property was by helicopter, by wide-tracked bombardier, or on foot.



BOLIVAR MINING CORPORATION LTD.

TOP COPPER PROSPECT

PROPERTY LOCATION MAP

BRITISH COLUMBIA

SCALE : 1" = 125 MILES

FIGURE 1

Heavy spring run-off washed away one of the bridges crossing the Swift River and resulted in flooding of some stretches of the road near the river. A new bridge was constructed and the causeway between the two bridges was enlarged diverting all the flow of the Swift under the bridges. Also limited stretches of the road were corduroyed due to thick mud.

From the Highway at Mile 755.5 the nearest points of supply are Morley River, at Mile 777, to the west, and Rancheria, at Mile 710, to the east. The nearest towns are Teslin at Mile 804, Watson Lake at Mile 635 and Whitehorse at Mile 908. Helicopters are operative out of Watson Lake (Frontier and Bow Helicopters - 105 air miles), Dease Lake (Bow - 110 air miles), Atlin (Trans North Turbo Air - 65 miles) and Whitehorse (TNTA - 125 miles).

B.C. Railways (formerly the P.G.E.) plans a rail extension from Prince George, through Dease Lake, to Whitehorse, via the Teslin Valley 20 miles west of the Property.

PHYSIOGRAPHY

The Property lies on a northeasterly trending ridge rising to 6000 feet, with spurs to the east. Much of the Property is above the tree line at 4000 to 4500 feet, and is craggy in contrast to the rounded hills to the southeast which are underlain by granodiorite. To the north and west the Property is bounded by the valley of the Swift River.

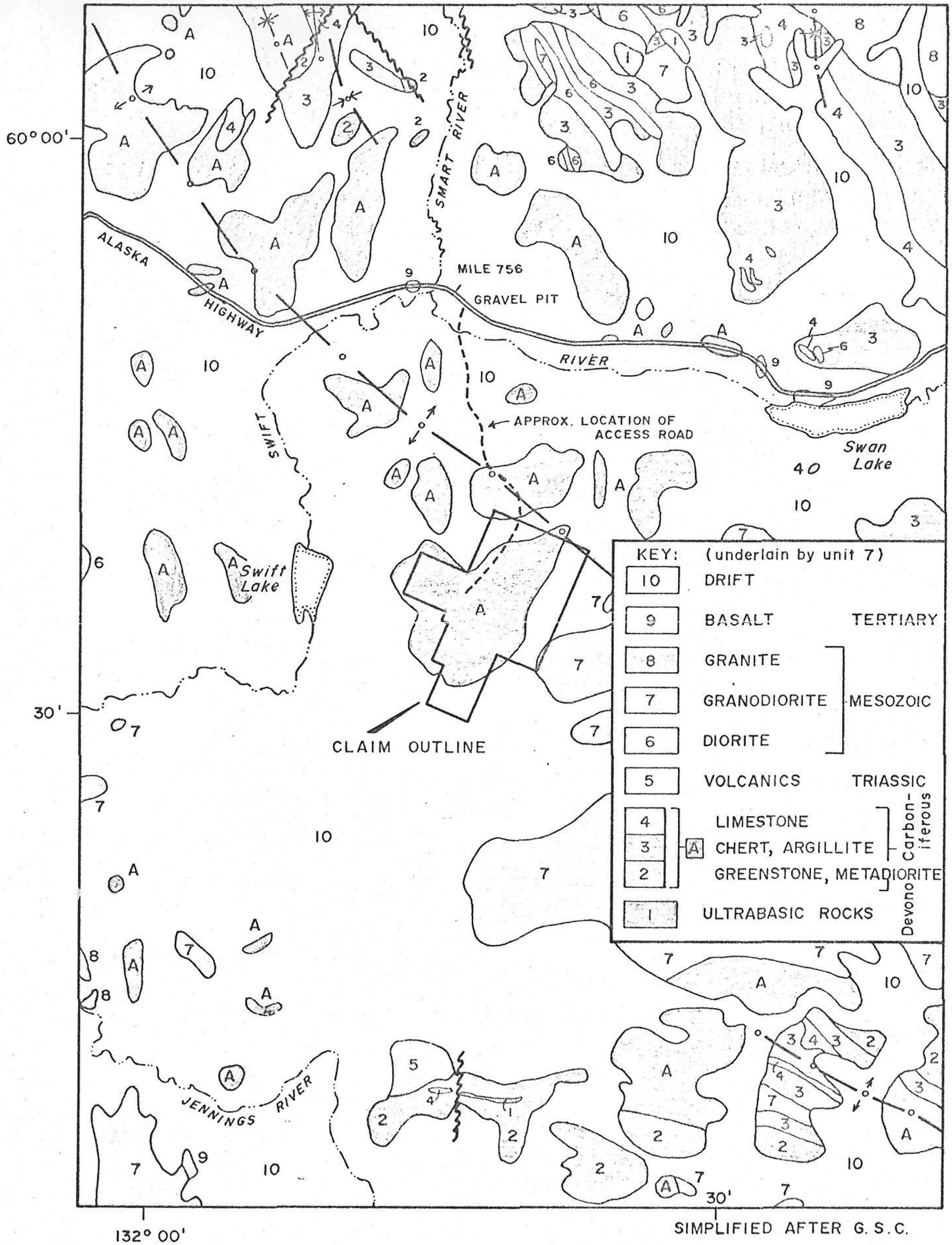
REGIONAL GEOLOGICAL SETTING

The Property lies in the northwest corner of the Jennings River Map-Area (104-O) (Gabrielse, 1969). He groups the Property rocks with the Big Salmon Complex of Mulligan (1963) and describes them thus:

"Carboniferous (mainly Mississippian(?)) comprising quartz-albite-mica gneiss, albite-actinolite schist, quartz-chlorite-epidote-albite gneiss, metachert, limestone, skarn, hornfels and dolomite; at least in part correlative with unit 7: Mississippian, Sylvester Group (upper part); massive greenstone, agglomerate, minor chert and metadiorite, local slate, argillite, chert, greywacke, pebble conglomerate, siltstone and limestone." - which is in turn underlain by ultramafic rocks.

Gabrielse also points out that the Big Salmon Complex is part of a regionally metamorphosed belt, bounded to the west by the Teslin Lineament (Cathro, 1972), that extends northward into the Teslin Map-Area (Mulligan, 1963) on into the Laberge Map-Area (Bostock and Lees, 1960), where it is mapped as the Yukon Group of uncertain age. The Teslin Lineament continues

FIG. 2 CLAIMS, ACCESS ROAD AND REGIONAL GEOLOGY



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on into the Carmacks Map-Area (Bostock, 1936) where it appears to have an important control on copper mineralization (Cathro, 1972). The Lineament is occupied by the Lewes River in the Carmacks area and appears to terminate two northeasterly trending copper belts, the northernmost represented by copper showings at Lonely Creek, Nansen Creek, Freegold Mountain and Williams Creek. However in the Carmacks District, Yukon Group metamorphics of similar lithology to the Big Salmon Complex underlie extensive areas on both sides of the Lineament.

To the south of the Property the belt is again continuous to the east of the Teslin Lineament in the form of the Oblique Creek Group (Gabrielse, 1969, Watson and Mathews, 1944). This formation is lithologically identical to the Big Salmon Complex except that the grade of metamorphism is generally lower and the time of metamorphism possibly younger (178 m.y. minimum, but complicated by much granitic intrusion). K/Ar dates from metamorphic muscovite in the Big Salmon Complex are 222, 214 and 194 m.y. (Triassic). Gabrielse's (1969) unit 11 is also correlated with the Big Salmon as is his unit 12. The belt can be traced onward to the south into the Cry Lake Map-Area (Gabrielse, 1962).

The above rock groups have the following features in common:

(1) They are, where stratigraphic control has been found, dated as Carboniferous.

(2) They have suffered an early Mesozoic (Triassic) metamorphism.

(3) They have been affected by at least two major phases of deformation, broadly synchronous with metamorphism.

(4) They are intruded by Middle to Late Mesozoic acidic plutons.

(5) The succession is typical of deposition in an oceanic environment, onto an igneous oceanic basement, as is characterized by the succession, in all the above groups, as follows:

Limestones
Cherts, argillites and metamorphic derivatives
Greenstones
Metadiorites
Peridotites

OBJECTS OF DETAILED GEOLOGICAL STUDIES

The above assemblage and environment is seen throughout the world to have characteristic associated mineralization ranging from chromite in the peridotites, pentlandite at the peridotite-metadiorite contact, copper-nickel sulphides in the metadiorites, copper-zinc in the greenstones and copper-pyrite (±gold) at the greenstone-sediment interface (examples of such mineralization can be found in the ophiolites of Cyprus Island and Greece in Europe). This last category would seem to represent the initial mineralization on the Top claim group. The intense deformation and metamorphism suffered by the assemblage must have had a mobilizing effect on the sulphide mineralization and, by analogy with known sulphide deposits in such a tectonic setting e.g. the nearby Anvil lead-zinc-silver deposit, such mobilization will most likely have resulted in concentration of sulphides in the hinge zones of folds. The more intense the deformation the greater the concentration, especially when the deformation is accompanied by metamorphism in a high confining pressure environment. The first major phase of deformation on the Property is of this type and may have resulted in the bulk of the concentration of copper mineralization seen at surface. The second phase of deformation has resulted in such concentration on scales from sulphide "saddle reefs" in the hinges of crenulations to major folds of amplitudes of 10 to 100 feet.

Hence a detailed structural study was undertaken in order to define the geometry of refolded assemblage, and specifically to define the positions in space of the F_1 and F_2 hinge zones in the copper bearing horizon, thus in turn defining the location of drill targets.

CLAIM AND GRID LOCATION

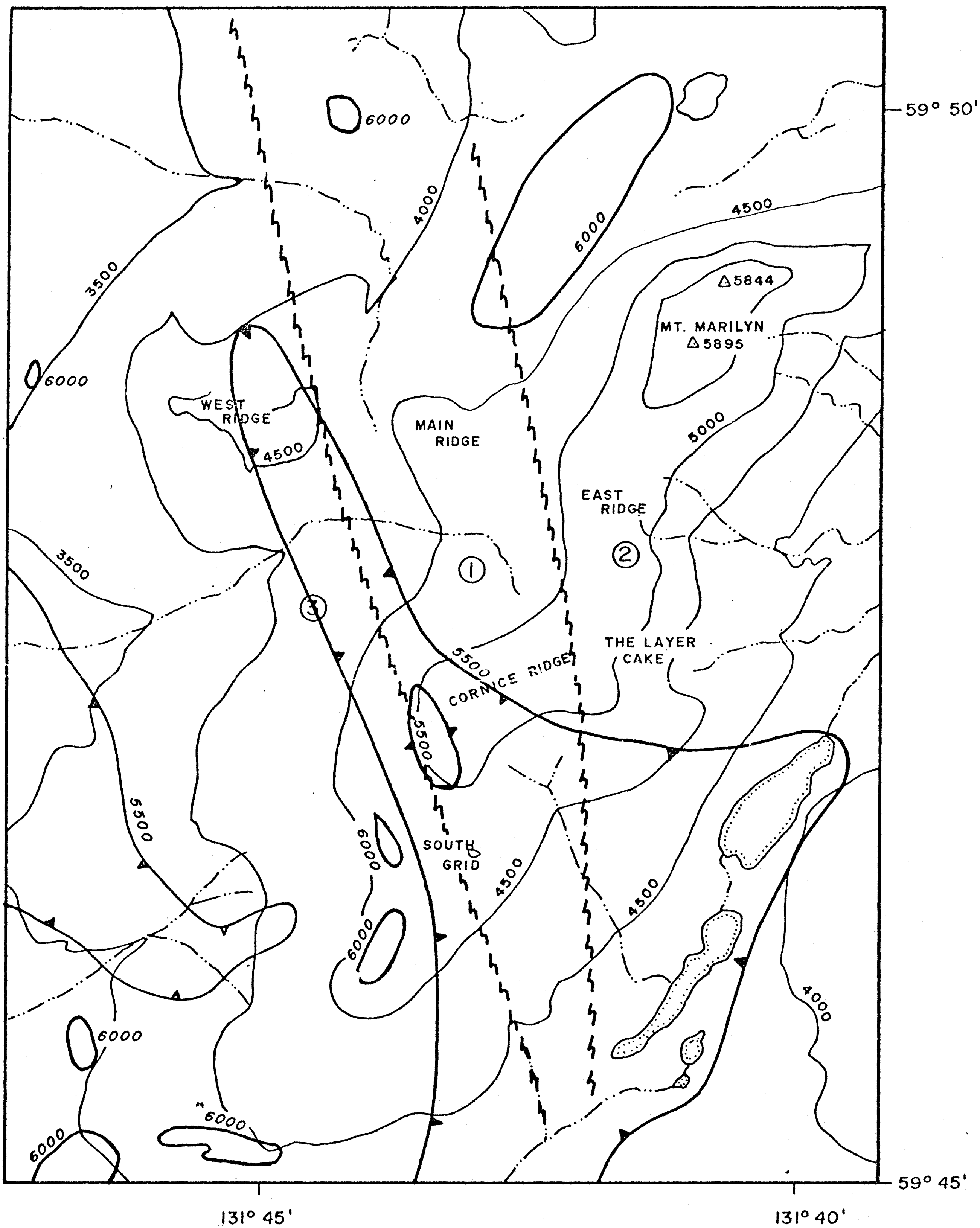
The production of a 1":1000' topographic map for the 1971 field season allowed and necessitated accurate location of claim posts and grid-lines. The majority of the former were found enabling a 1":1000' claim map to be produced (enclosed). A further twenty-three claims were staked to complete coverage of the area of interest.

The accurate location of the grid with respect to topography enabled comparison of geological, geochemical and geophysical surveys. Some additional picketing was carried out over areas of geölogical interest and complexity where topographic control was poor.

GEOCHEMISTRY

Soil sampling of the southern portion of the grid, lines 12 North to 28 South, was completed during the 1971 season. A limited number of samples returned copper values

FIG. 3 GENERAL DATA



TOTAL MAGNETIC INTENSITY CONTOURS, 5500 AND 6000 GAMMAS, APPROXIMATE:

MAJOR FAULTS:

STRUCTURAL DOMAINS: ①, ②, AND ③

Scale — 1" = 50,000"

between 200 and 500 p.p.m. - the range of the lowest order of anomaly for the 1970 soil survey of the main grid. These anomalous values seem to define ENE trends and to lie on prominent ENE trending air photo lineaments which are thought to be late faults with minor displacements. Lithologically, most of the anomalous values lie in the metadioritic basement rocks (see Geology: Stratigraphy). The favourable horizon for copper mineralization, defined below, is poorly developed in this region and it seems unlikely that the faults are tapping near-surface mineralization of consequence. Hence no further work is recommended on the southern grid area.

Overlaying the results of the 1970 copper soil survey over the 1971 geology shows that, in general, anomalies can be correlated with outcrop of actinolite bearing rocks, most of which show visible copper mineralization. Thus both geochemistry and prospecting support the contention that mineralization is stratigraphically controlled. The 1970 molybdenum soil survey shows a linear molybdenum high that can be correlated with the outcrop of a quartz-feldspar porphyry dike intruding the Main Ridge and trending approximately north-west.

The 1970 results for copper have been replotted at 1":500' (see enclosed Map 2, and Turnbull and Simpson (1971) for details of methods employed).

GEOLOGY

INTRODUCTION

The Main and West Ridges of the Property were mapped on scales of 1 inch to 200 feet and the remainder of the Property on a scale of 1 inch to 500 feet (Maps 4 and 2 enclosed). Exposure on the ridges is good and the lack of erratic material enabled some inferences to be made from float and small outcrop sampling.

STRATIGRAPHY

The stratigraphic column presented here for the Property is the simplest sequence that can be deduced and assumes no primary depositional duplication on greater than a 50 foot scale. The prevalence of sequences A-B-C-B-A rather than A-B-C-A-B-C, and the style of the early deformation justifies this assumption. Hence the large number of duplications mapped on the East Ridge are deemed to be tectonic and due to the early deformation. In the case of the many limestone duplications on Cornice Ridge the assumption may be invalid.

The column is as follows:

Unit M - Meso to melanocratic, schistose to massive rocks thought to be metagabbros, metadiorites, metadolerites and metabasalts. Schistose varieties contain appreciable biotite, the remainder consist of actinolite + albite + quartz + epidote + oxide. A pre-schistosity compositional layering is sometimes apparent which may be an igneous flow or crystal settling banding.

Unit AB - Interbanded muscovite schists, with biotite and garnet porphyroblasts (Unit A), and quartzites. Banding may be on the scale of inches, and the rock resemble a metamorphosed ribbon chert-argillite sequence, or on the scale of tens of feet. The quartzites are commonly rusty weathering after pyrite and/or pyrrhotite.

Unit B - Quartzite, often white and massive, but more usually with a good muscovite parting. Pure quartzites seem to overly Units AB and M, and thus the latter units may be diachronous. Trace quantities of manganese epidote occasionally give the quartzites a pink tinge, and are associated with thin layers of oxide and manganese garnet.

Unit C - Chlorite - muscovite schists, not always developed or readily distinguishable from Units A and E.

Unit D - Actinolite bearing rocks of very variable habit including actinolitic quartzites and banded leucocratic gneisses, actinolite - chlorite schists, actinolite - epidote skarns (including garnet - epidote - quartz skarns) and melanocratic actinolitic gneisses. Unit Dc distinguishes the leucocratic varieties from the rest where differentiated. This unit appears to be the initially copper rich horizon and is thought to be a metavolcanic, probably initially a tuff.

Unit E - A "sack" unit describing rocks occurring between Units D and F. Not always developed, and including talc schists, pyritic quartzites, muscovite schists with biotite porphyroblasts, etc.

Unit F - Buff marbles interbanded with quartzites and micaschists, and locally actinolitic. Banding may be on a scale of tenths of an inch to a few feet.

Unit G - Massive buff, white or cream marble of thickness greater than 20 feet (thinner units are generally repeated and mapped as Unit F). Occasionally tremolitic.

Unit H - Impure, grey to black marbles with silicate stringers, sometimes very fissile and grading with increasing mica content into:

Unit J - Black, calcareous, graphitic mica schist.

Unit N - Metagreywacke. This rock unit apparently does not occur on the area covered by Map 2 but is found about two miles to the north. It is important in that specimens show very well the three main fabrics of rocks developed within the Property i.e. bedding, a pervasive schistosity and a later crenulation cleavage. It shows these features because the intensity of the first deformation and metamorphism are uncharacteristicly low and hence graded bedding is clearly preserved and clearly discordant to the pervasive fabric.

Whereas there is no discordant intrusive contact between Units M and B, four other units have demonstrably intrusive contacts:

Unit L - Granodiorite, with orthoclase phenocrysts, forming the Simpson Peak Batholith which bounds the Property to the south-east.

Unit P - Mafic dikes, from 1 to 10 feet wide. Thin section study shows that biotite is a primary mineral and hence these dikes may all have lamprophyric affinities. Most show ophitic texture and look very much like dolerites, however.

Unit Q - Feldspar porphyry of probably andesitic composition. One dike of this material was found on the Main Ridge.

Unit R - Quartz - feldspar porphyry, always altered but probably originally rhyodacitic in composition. A very continuous north-east trending dike from one to fifty(?) feet wide passes through the Main Ridge and can be correlated with the molybdenum soil survey anomalies (copper values do not show this correlation). Varieties of this unit have a medium grained matrix and could be termed porphyritic microgranite. One occurrence shows a strongly crenulated schistosity and hence is pre-tectonic, the remainder of the above intrusives being post-tectonic.

Often the control was not sufficient to distinguish the above units and in these cases the sequence is divided into two groups - non-calcareous and calcareous.

Unit MB - Including Units M, A, AB, B, C and D.

Unit FJ - Including Units E, F, G, H and J.

In some cases it is felt that these two "super-units" can be distinguished by vegetation cover and topographic expression on the ground and in air-photo study.

PETROGRAPHY

Petrographic study of the pelitic and basic rocks in the area indicates the following metamorphic-tectonic history:

(1) Complete recrystallization of the assemblage during the early deformation, giving strong alignment of all silicate minerals parallel to the axial plane of the early folds. Metamorphism was of at least middle greenschist facies and took place in an environment of high confining and directed stress.

(2) Overgrowth on the above fabric by almandine garnet, unaligned biotite, epidote, albite, cordierite and actinolite porphyroblasts indicate upper greenschist facies metamorphism in an environment of low confining and directed stress. However, porphyroblast growth locally pre-dates, occurs during or post-dates the formation of a second non-pervasive crenulation cleavage. Hence the stresses giving rise to this fabric must have been internal, body or gravitational forces rather than an externally applied stress system. Locally, it seems, internal stresses were concentrated to a point where muscovite and chlorite growth occurred along the second fabric.

(3) Growth of the late biotite porphyroblasts in linear alignment under the influence of a stress system apparently related to a broad late arching of the assemblage.

(4) Retrograde metamorphism leading to various degrees of breakdown of garnet, biotite, cordierite and albite mainly to finer micaecous products.

STRUCTURE

Structural mapping and subsequent analysis of data leads to proposal of the following sequence of structural events:

(1) Tensional deformation of the sequence allowing introduction of gold-quartz veins and (probably) the copper mineralization with its associated volcanic host.

(2) Recumbent, isoclinal, similar, folding of the assemblage with approximately NW-SE trending axes. Assuming the above stratigraphy, polarity (direction of tectonic transport) was to the

south-west, at least in structural domains (1) and (2). A pervasive axial plane schistosity, s_1, was formed such that in the great majority of exposures it is sub-parallel to the original compositional layering (bedding), s_0. Where the original layering was of suitable thickness minor folds formed and can be seen in outcrop. Large scale early folds can be inferred from the 1":500' mapping. Thrusting may link this deformation to the next:

(3) Inclined to recumbent, open to tight folding of various styles according to rock type (flexural slip chevrons, cusps, similar folds, concentric buckles, etc.) but dominantly of chevron type, indicating high level, brittle deformation. Occasionally a non-pervasive crenulation cleavage, s_2, accompanys the folding, which is itself arched about the same fold axis. Axes trend south 30° east with variable plunge.

(4) A regional arching with concomitant crenulation of earlier fabrics, mineral lineation and conjugate fault pattern. The Property lies on the southern limb of this east-southeasterly trending anticlinorium (Gabrielse, 1969).

(5) Minor deformation associated with the intrusion of the Simpson Peak Batholith.

(6) Strike slip faulting along the major lineaments shown on the 1:50,000 scale map.

(7) Two later periods of minor and local faulting.

Stereographic plots of the four fold phases F_1, F_2, F_3, F_4 are shown overleaf. Sulphides are acknowledged as being structurally incompetent as compared to silicates and hence each of these fold phases should result in migration of sulphides towards the hinges of folds. The combined metamorphic and deformational intensity of the first folding is by far the greatest of the four and the latter two fold phases may be considered negligible.

Hence the exploration target is primarily the F_1 hinge zone of the copper bearing horizon (Unit D) with secondary consideration given to the intersection of F_1 and F_2 hinge zones in this horizon.

Structural analysis has defined the position in space of F_2 hinge zones, but has only defined the trend of F_1 hinge zones, and the folded surfaces in which they lie. A low resistivity, moderate frequency effect and resultant high metal

FIG. 4 STEREOPLOT OF FIRST, SECOND, THIRD AND FOURTH FOLD AXES

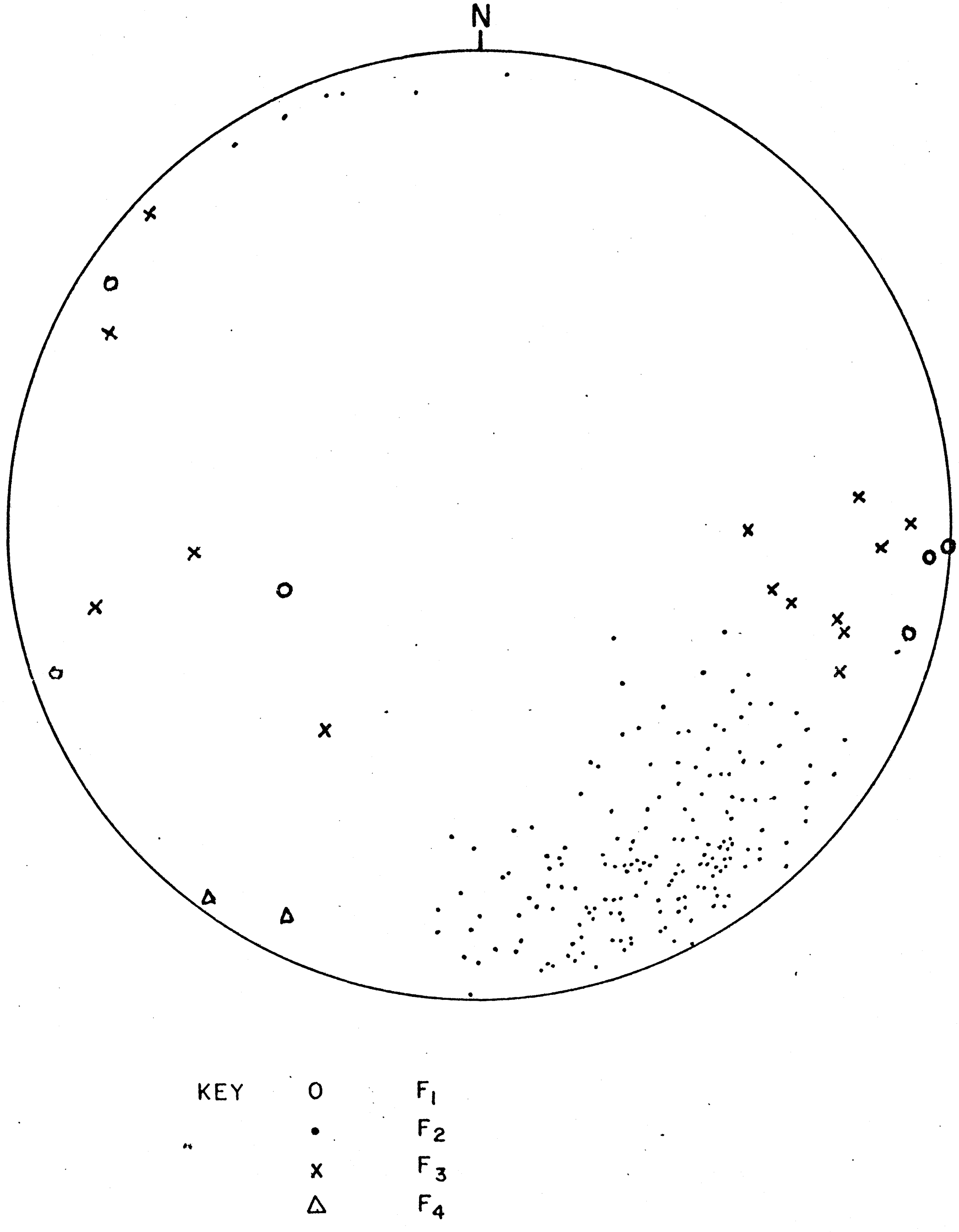
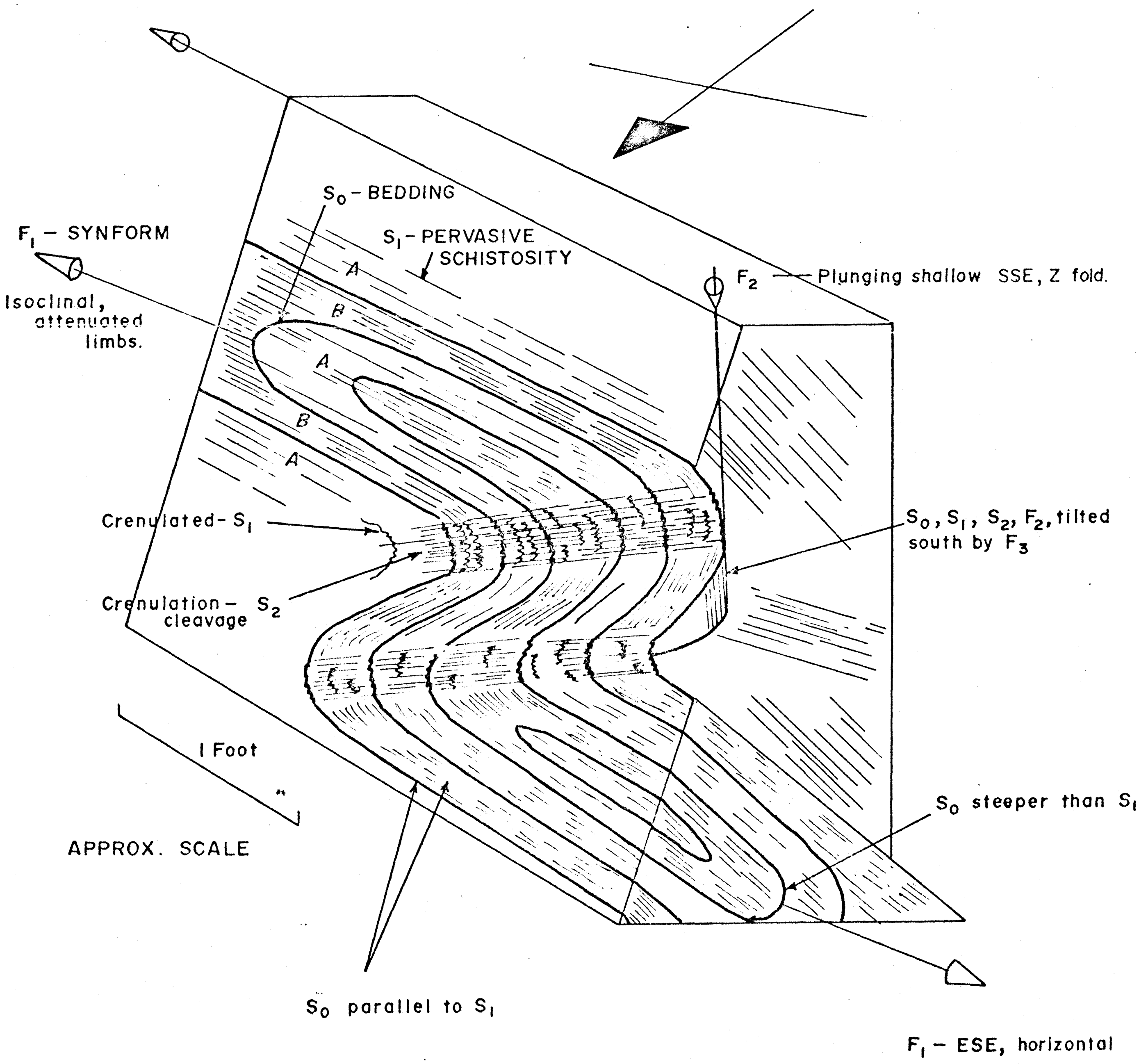


FIG. 5 STRUCTURAL ELEMENTS OF THE MAIN RIDGE

—— MODIFIED AFTER A FIELD SKETCH MADE AT 112N/79E ON THE MAIN RIDGE. LITHOLOGIES INTERBANDED QUARTZITES (YELLOW - A) AND MICA SCHISTS (PINK - B).

MAIN RIDGE SCARP - TRENDING NW-SE, DIPPING N.



factor zone, of F_1 trend, within this plane is thought to be the likely locus of the hinge zone, and is the proposed target for further work.

MINERALIZATION

Chalcopyrite and secondary copper carbonates are found in the following settings.

(1) Finely disseminated, in association with pyrite and pyrrhotite in mafic varieties of Unit D - the actinolite - epidote gneisses, especially where hybridized with stratigraphically overlying limey rocks.

(2) Coarser disseminations in andradite - epidote - actinolite - calcite - quartz skarns, where mafic dikes cut the Unit D - Unit F contact.

(3) Blebs in vein quartz, which may be pre-metamorphic and pre-deformation, or a later post-tectonic remobilization of copper into tensional fissures.

(4) Dispersed fine disseminations in leucocratic actinolite gneisses, quartzites and calcareous mica schists, probably due to metamorphic redistribution.

Gold was noted in one locality, in isoclinally folded, doubly refolded, quartz veins within quartzite, with associated green (malachite?) staining.

Pyrrhotite is abundant in the black calcareous mica schists, in the mafic actinolitic gneiss and in the skarns. Pyrrhotite and/or pyrite, usually oxidized, occurs in the micaceous quartzites of Unit AB and E.

Graphite is a minor constituent of thin horizons of micaceous quartzites of Unit AB, but a more important constituent of the black calcareous mica schists (Unit J).

A good metamorphic foliation is not common in sulphide-rich actinolitic rocks, but where it is present sulphides tend to be platy parallel to it. In the core and in outcrop there is a correlation between copper content and strength of development of the second schistosity (in turn correlatable with F_2 fold hinges). Hence the second deformation has concentrated sulphide mineralization. In drill core of black calcareous mica schist from Hole C-7-71 this effect is very noticeable due to the presence of a good first schistosity, abundant pyrrhotite (+ trace chalcopyrite) and strong second fabric development - pyrrhotite "reefs" occur at the hinges of crenulations, having been squeezed out of their limbs.

Evidence for concentration of sulphides in hinges of the first folds is unsatisfactory - wherever surface outcrop indicates the exposure of a first fold hinge zone the copper bearing horizon is absent or weakly developed. Where weakly developed, however, the horizon is copper-rich and gives a high geochemical soil anomaly. For example, 0.5% copper was recorded in soils at the crest of the east ridge at grid-line 100N, where an antiformal F_2 closure in Unit D is postulated and exposures show heavily malachite stained and chalcopyrite-bearing lenses of actinolite - epidote gneiss. Unit D is one or two feet thick on the upper limb of this fold, whereas on the main ridge drill hole C-3-71 intersected a true thickness of approximately 400 feet of Unit D.

Analogy with mineral deposits in a similar deformational and metamorphic setting is perhaps a major factor in considering the potential of the mineralization. In such known deposits e.g. the Anvil Mine, Yukon; the Bathurst Camp, New Brunswick; Mount Isa, Australia, etc., the mineralization has been concentrated to economic grade by a combination of intense repeated deformation and metamorphism, and the effects of re-distribution of sulphides are proportional to the intensity of each deformational event. Hence proven concentration of copper by the second deformation at Top should indicate much greater concentration by the first deformation and it may be that surface showings represent merely the sheared out, remnant limbs of rootless folds in more concentrated sulphides. Certainly it is very unlikely that the surface exposures on the Main Ridge (approximately parallel to the F_1 trend) represent the best development of mineralization.

SYNTHESIS

The geological information obtained can be tied together into the following historical sequence:

(1) Pre-Devonian ? - Formation of igneous oceanic basement.

(2) Devonian ? to Permian ? - Formation of the sedimentary stratigraphic column.

(3) Devonian ? - Introduction of copper-iron sulphide (+ minor gold) mineralization into and/or onto the developing sedimentary succession during a limited volcanic episode.

(4) Triassic - High confining pressure metamorphism and isoclinal folding. Copper migrates to fold noses.

(5) Triassic - Low confining pressure metamorphism and gravity folding. Further minor migration of copper to second fold noses.

(6) Triassic to Early Jurassic - Low confining pressure metamorphism and arching, with associated conjugate faulting and dike intrusion. Copper incorporated in associated skarns and fracture fillings.

The metamorphism has been radiometricly dated by the Geological Survey of Canada. Three determinations by the potassium - argon method on muscovites give 214, 222 and 194 million years. A biotite potassium argon date of 124 million years may be due to later intrusion of diorite to the north of the Property, (Gabrielse, 1967).

(7) Early Jurassic - Intrusion of the Simpson Peak granodiorite (3 potassium - argon ages of 183 million years, one of 165 million years) and minor local deformation.

(8) Jurassic ? - Right lateral strike-slip faulting. Some remobilization of copper.

(9) ? - Block faulting, minor displacements. Some remobilization of copper as indicated by geochemistry on the south grid.

(10) Recent ? - Minor local slump faulting.

GEOPHYSICS

To date, the Property has been covered by airborne magnetic and electromagnetic surveys, flown by Lockwood Survey Corporation Ltd. of Toronto, for Cyprus Exploration Corporation, Ltd., in 1970, and the areas of interest within the Property have been covered by ground magnetic and induced polarization surveys conducted by Peter E. Walcott and Associates Ltd., for Bolivar Mining Corporation Ltd., in the summers of 1970 and 1971. This latter work is described in a separate report by Peter E. Walcott (1972).

The airborne magnetic survey seems to outline the outcrop of the deduced igneous basement (Unit M) to the metasediments and also the limey sequence (Unit FJ). There is no marked airborne electromagnetic feature over the Property.

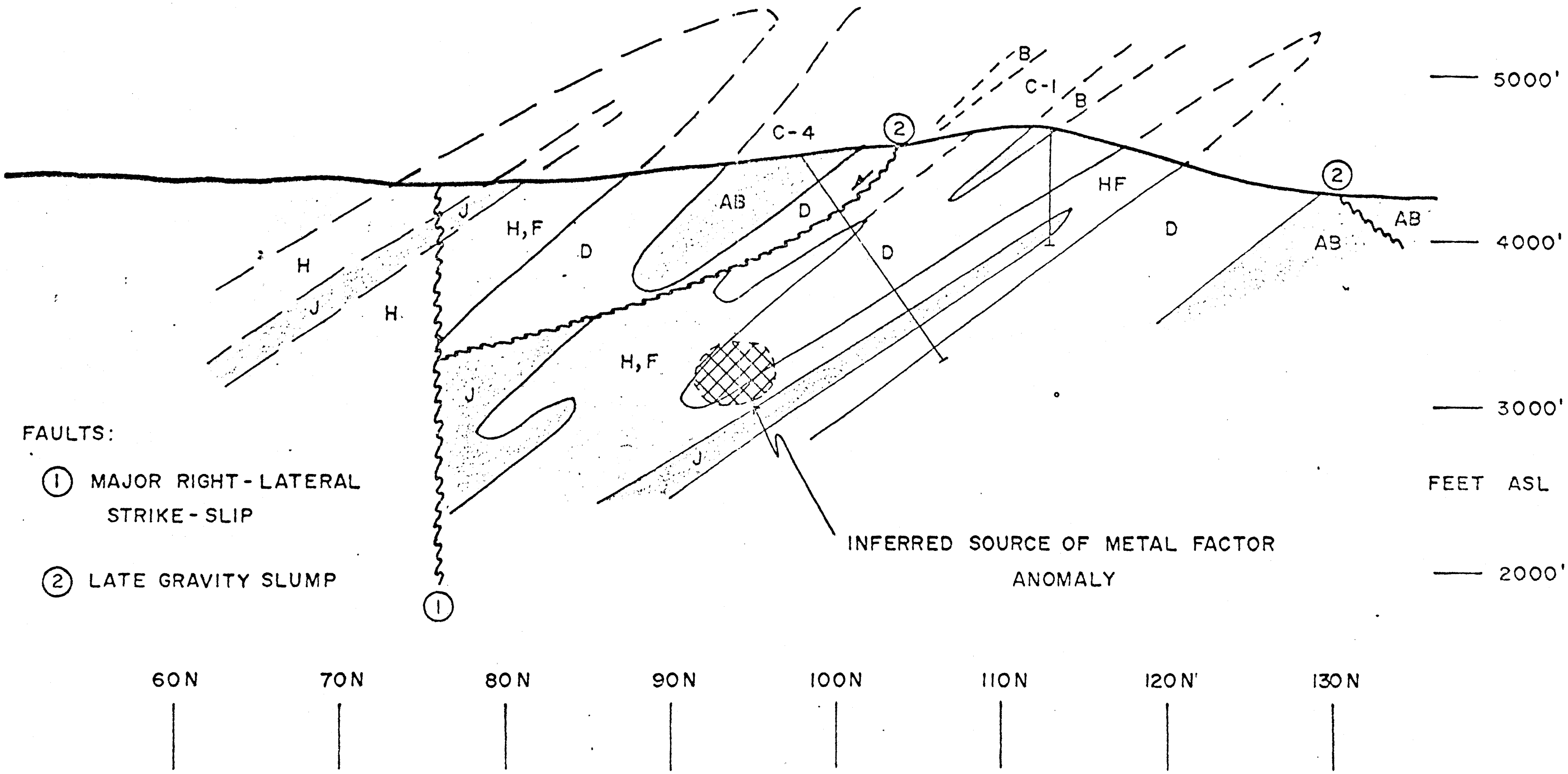
Ground magnetometer surveying pinned down the outcrop of Unit D and its associated high pyrrhotite content, and also separated the metasediments from the igneous basement. Both airborne and ground magnetometry imply that this basement may underly the northern margin of the Property. Hence there are three main magnetic units in the writer's opinion: the mineralization-bearing greenstone, the basement rocks and a gradational unit of metasediments - the magnetic expression probably dependant on the relative thickness of the constituent units.

The I.P. survey was complicated by presence of the graphitic, pyritic and pyrrhotitic horizons in Units AB and J. Hence both good geological control and an appreciable thickness of non conductor-bearing rock are necessary for reliable interpretation. Many anomalous apparent frequency effects and apparent resistivities were recorded over the Property and some anomalies may be of economic significance. However, lack of surface copper showings up-dip from these anomalies must preclude their consideration at present.

It is proposed, on the basis of surface showings and outcropping width of host rock, that advanced exploration in 1972 should be restricted to the area bounded to the north by the Main Ridge, to the south by Cornice Ridge, and the east and west by the major fault zones shown on Fig. 3. The "average" attitude of compositional layering within this area can be considered as NW-SE, dipping 35^{o} SW, (this figure accounts for the effects of F_2 and F_3 on a post-F_1, horizontal "layer cake"). The axial plane trace of an F_1 synform in Unit D with quartzite in its core runs along the dip slope of the Main Ridge, and hence the down dip extension of a zone symmetrical about this plane should enclose the best mineralization. However structural analysis has failed to predict the position of best mineralization within this zone.

Three I.P. profiles, with electrode separations of 300 feet and 600 feet, were run along lines 65E, 75E and 85E, parallel to the base line and approximately normal to the "average" strike.

Line 65E shows a marked resistivity low, metal factor high, but only minor frequency effect, at 80N which may represent a fault associated with the western strike-slip zone. Another resistivity low and marked metal factor effect is observed on shallow separations at 98N dipping south-west (deduced from the a = 300 feet and a = 600 feet profiles on 65E and 96N) - this feature has sub-anomalous frequency effects. Higher frequency effects to the north, associated with high resistivities and medium metal factors, have been drilled and are due to disseminated pyrite in Unit D and disseminated graphite and pyrrhotite in Unit J, with only minor chalcopyrite. Low resistivities and medium frequency effects at 122N are apparently due to outcropping pyrrhotite-rich Unit D. These zones can be traced along geological strike onto lines 75E and 85E, except for the feature at 80N, which shows high frequency effects on the other lines indicating graphite or sulphide-bearing material. The zone's resistivity lows are very marked and, along with geological inference, indicate that a graphitic horizon (Unit J) is responsible for the anomaly. The n = 1, a = 300 feet resistivity contour map outlines the surface position of this zone. North of this zone and parallel to it, a metal factor maximum zone on the n = 4, a = 600 feet readings



INFERRED SCHEMATIC GEOLOGICAL SECTION ALONG LINE 65 E

SHOWING F_1 ISOCLINAL FOLDS TILTED SOUTH BY F_3 (F_2 EFFECT NEGLECTED)

HORIZONTAL SCALE = VERTICAL SCALE = 1" : 1000'

FIGURE 6

is indicated. This anomaly has low resistivities and medium frequency effects that may indicate a more massive distribution of conductors than the disseminated material drilled to the north. It also lies approximately in the zone of best potential mineralization as outlined by structural analysis. Two interpretations are possible:

(1) that the anomaly is due to a minor antiformal closure in Unit J and hence not of interest.

(2) that the anomaly is due to a synformal closure in Unit D, which is more conductive and less polarizable than Unit D intersected in the holes. That is, that the anomaly represents a more massive concentration of pyrite, pyrrhotite and chalcopyrite, with the added possibility that the latter might be concentrated to mineable grade. The shape of the anomaly indicates a source at 1000-1500 feet with a width approximating to that of the separation, i.e. 500 feet, and a length of 4000 feet probably terminated to the east and west by strike slip faults.

Many other geophysical features are apparent on the I.P. profiles. Some with very marked resistivity contrasts and low frequency effects can be fairly confidently ascribed to faults. However, due to the great inhomogeneity of the assemblage both lithologically and with respect to distribution of conductors, the I.P. results must be interpreted with caution, and good geological and geochemical support are necessary before such features can be considered as drilling targets.

DRILLING

Thirty-six hundred feet of diamond drilling, comprising four holes, was undertaken in August, 1971. Graphic logs for the holes are shown on Sections 1, 2 and 3 enclosed. Details of the holes are as follows:

C-1-71

Position: 113N, 65+50E
Attitude: Vertical
Depth: 708 feet
Target: Inferred synformal closure in Unit D, down-dip from some of the best surface showings. Also a high resistivity, high frequency effect zone on the a = 300 feet profiles. Subsequent analysis indicates that the inferred synform is in fact an antiform.

C-2-71

Position: 103+29N, 86+75E
Attitude: 045°, 60°
Depth: 724 feet
Target: High resistivity and frequency effects on the a = 300 feet, 86E profile. Testing the down-dip extension of a thin, mafic horizon of Unit D; the occurrence of trace copper in quartzite and the possibility of fault influence on mineralization.

C-3-71

Position: 111N, 54+60E
Attitude: Vertical
Depth: 735-5 feet
Target: Strong frequency effect and magnetic anomalies, a very thick section of Unit D, surface showings, and a down-dip situation as compared to C-1-71.

C-4-71

Position: 98+20N, 65+04E
Attitude: 030°, 55°
Depth: 1428 feet
Target: High frequency effect values at depth on the 65E, a = 600 feet profile and the down-dip extension of the zone tested in C-1-71 and C-3-71.

It was concluded that most high frequency effects were due to disseminated pyrite, pyrrhotite, graphite and only minor chalcopyrite. Drilling results and further structural analysis have not supported the hypothesis that the zone tested is the most favourable from a structural aspect. In view of the more conductive, massive nature of deposits found in similar metamorphic and structural settings elsewhere it is felt that a more realistic drill target would be based on low resistivity, medium frequency effect response, coupled with favourable geological evidence.

CONCLUSIONS AND RECOMMENDATIONS

It is concluded that:

(1) Copper mineralization in the Top Claim Group, Atlin M.D., B.C., was broadly contemporaneous with sedimentation.

(2) Since primary deposition, copper distribution has been extensively affected by intense deformation and high pressure/high temperature metamorphism and also affected by later folding, high temperature regional and contact metamorphism and faulting.

(3) Such redistribution will have resulted in greatest concentration of copper in hinge zones of early folds.

(4) The most favourable locality of such concentration is in a zone dipping 35°SW from the crest of the Main Ridge - the site of the best surface showings.

(5) Geophysically, the most favourable response will be low resistivity, medium frequency effect due to medium induced polarization, and subsequent high metal factor.

(6) Such a response occurs, as a linear zone, within the structurally favourable zone outlined in (4) above. This zone is 4000 feet long, probably 500 feet wide and lies at a depth of 1000 to 1500 feet.

It is recommended that:

(1) 3000 feet of diamond drilling, comprising two vertical holes of 1500 feet each, be undertaken at 65E, 94N and 85E, 80N, to test the above zone.

Respectfully submitted,

P.F. Lewis

P. F. Lewis.

APPENDIX A

CLAIMS AND ASSESSMENT

APPENDIX A: CLAIMS & ASSESSMENT - APR. 30, 1972

GROUP	GROUPING DATE	CLAIM NAME	RECORD NO.	RECORDING DATE	EXPIRY DATE
A	1 Apr 71	TOP 210-213	15026-29	22/4/70	22/4/76
		TOP 232-233	15048-49	"	"
				SUB TOTAL - 6 CLAIMS	
B	1 Apr 71	TOP 214-221	15030-37	22/4/70	22/4/75
		TOP 223	15039	"	"
		TOP 234-243	15050-59	"	"
		TOP 249-253	15065-69	"	22/4/74
		TOP 254	15070	"	22/4/75
		TOP 327-330	15143-46	"	"
				SUB TOTAL - 29 CLAIMS	
C	1 Apr 71	TOP 222	15038	22/4/70	22/4/76
		TOP 307	15123	"	"
		TOP 309	15125	"	"
		TOP 311	15127	"	"
		TOP 313	15129	"	"
		TOP 317-326	15133-142	"	"
				SUB TOTAL - 21 CLAIMS	
D	1 Apr 71	TOP 50	7832	4/1/67	4/1/73
		TOP 52	7834	"	"
		TOP 65-66	7847-48	"	"
		TOP 67-70	7849-52	"	4/1/74
		TOP 81	7863	"	4/1/73
		TOP 83	7865	"	4/1/74
		TOP 85	7867	"	"
		TOP 260	15076	22/4/70	22/4/76
		TOP 267-268	15083-84	"	"
		TOP 287-306	15103-122	"	"
		TOP 308	15124	"	"
		TOP 310	15126	"	"
		TOP 312	15128	"	"
		TOP 314	15130	"	"
		TOP 316	15132	"	"
				SUB TOTAL - 39 CLAIMS	
E	1 Apr 71	TOP 256-258	15072-74	22/4/71	22/4/76
		TOP 261-266	15077-82	"	"
		TOP 269-286	15085-102	"	"
				SUB TOTAL - 27 CLAIMS	

GROUP	GROUPING DATE	CLAIM NAME	RECORD NO.	RECORDING DATE	EXPIRY DATE
GREEN	1 Mar 72	TOP 336-339	16151-54	22/4/71	22/4/74
		TOP 342-371	16157-186	"	"
		TOP 376	16191	"	"
		TOP 379-80	16194-95	"	"
		TOP 391-92	16206-207	"	"
		TOP 513	17288	10/9/71	10/9/74
				SUB TOTAL -	40 CLAIMS
RED	17 Apr 72	TOP 110-112	7892-94	4/1/67	4/1/78
		TOP 125	7907	"	"
		TOP 127	7909	"	"
		TOP 129	7911	"	"
		TOP 200-207	15016-23	22/4/70	22/4/80
		TOP 209	15025	"	22/4/78
		TOP 224-31	15040-47	"	"
		TOP 244-48	15060-64	"	"
		TOP 514-523	17289-98	10/9/71	10/9/80
				SUB TOTAL -	38 CLAIMS
BLUE	17 Apr 72	TOP 79-80	7861-62	4/1/67	4/1/78
		TOP 94-96	7876-78	"	"
		TOP 107-109	7889-91	"	"
		TOP 208	15024	22/4/70	22/4/80
		TOP 501-508	17276-83	10/9/71	10/9/80
				SUB TOTAL -	17 CLAIMS
YELLOW	17 Apr 72	TOP 92	7874	4/1/67	4/1/78
		TOP 509-512	17284-87	10/9/71	10/9/80
				SUB TOTAL -	5 CLAIMS

TOTAL CLAIMS IN GOOD STANDING - 222

CLAIMS ALLOWED TO LAPSE AS AT 22 APR. 72

UNGROUPED	TOP 340-341	22/4/71	22/4/72
	TOP 372-375		
	TOP 377-378		
	TOP 381-390		
	TOP 393-408		

TOTAL - 34 CLAIMS

The following assessment years were applied for 71/72 to the groups shown and distributed as indicated on the accompanying map.

GROUP A	30 yrs.
GROUP B	50 yrs.
GROUP C	6 yrs.
GROUP D	6 yrs.
GROUP E	NIL
GREEN GROUP	89 yrs.
RED GROUP	140 yrs.
BLUE GROUP	108 yrs.
YELLOW GROUP	32 yrs.
TOTAL	461 yrs. applied

APPENDIX B

MAP INVENTORY

APPENDIX B: MAP INVENTORY

1971

CLAIM AND ACCESS ROAD LOCATION	1" = 4500'
TOPOGRAPHY	1" = 1000'
AIR PHOTO MOSAIC NEGATIVE	1" = 1000'
CRONAFLEX OF ABOVE	
GEOCHEMICAL SOIL SURVEY - COPPER	1" = 400'
- MOLYBDENUM	1" = 400'
CLAIMS LOCATION MAPS	1" = 250 Miles
	1" = 4 Miles
	1" = 1000'
MAGNETOMETER SURVEY (2 SHEETS)	1" = 400'
INDUCED POLARIZATION SURVEY:	
APPARENT RESISTIVITY CONTOURS, a = 300', n = 2,	1" = 400'
APPARENT FREQUENCY EFFECT CONTOURS, a = 300', n = 2	1" = 400'
I.P. PROFILES,	
LINES 64N, 72N, 80N, 88N, 92N, 96N, 108N, 120N, 128N, 152N, 160N, 168N, 176N	1" = 300'
100N, 104N	1" = 200'
100N, 104N	1" = 400'

1972

CLAIMS	1" = 1000'
CLAIM OUTLINE AND GRID	1" = 1000'
GEOLOGY	1" = 1000'
TOPOGRAPHY (2 SHEETS)	1" = 500'
GEOLOGY (2 SHEETS)	1" = 500'
GEOCHEMICAL SOIL SURVEY COPPER (2 SHEETS)	1" = 500'
GRID (2 SHEETS)	1" = 500'
PORTION OF GRID USED IN I.P. SURVEY	1" = 500'
I.P. CONTOUR PLANS	
APPARENT RESISTIVITY, n = 1 to 4, (4 SHEETS)	1" = 500'
APPARENT FREQUENCY EFFECT, n = 1 to 4, (4 SHEETS)	1" = 500'
APPARENT METAL FACTOR, n = 1 to 4, (4 SHEETS)	1" = 500'
MAGNETOMETER SURVEY	1" = 500'
TOPOGRAPHY (4 SHEETS)	1" = 200'
MAIN RIDGE, WEST RIDGE, CORNICE RIDGE, SOUTH GRID	
GEOLOGY AND GRID, MAIN RIDGE	1" = 200'
GEOLOGY, WEST RIDGE	1" = 200'
I.P. PROFILES,	
LINES 28S, 12S, 4N	1" = 300'
LINES 72N, 80N, 92N, 100N, 108N, 120N FROM 20E TO 60E	1" = 300'
LINE 80N FROM 100E TO 170E	1" = 300'
LINES 65E, 75E, 85E	1" = 300'
LINES 65E, 75E, 85E, 96N	1" = 600'

APPENDIX C

REFERENCES

APPENDIX C: REFERENCES

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APPENDIX D

NOTES ON SECTIONS 1, 2 AND 3

APPENDIX D: NOTES ON SECTIONS 1, 2 AND 3

(1) Thickening of horizons affected by F_2 is due to the oblique trend of F_2 with respect to the trend of the section (e.g. Unit H, Section 1).

(2) Sub-domains mentioned in the stereoplots and sections are not referred to in the text. Detailed structural analysis has allowed the division of domains 1, 2 and 3 into sub-domains on the basis of variation in the statistical mean S_2 attitude and F_2 plunge.

(3) Lensing out of horizons (e.g. Unit B, Section 1) is inferred as being due to F_1 (i.e. Unit Dc is a synformal fold with B in its core).