



Kam-Kotia mines limited

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TELEPHONE 362-4581

801530

March 2, 1973.

Mr. W. Sharp, P. Eng.,
171 W. Esplanade,
North Vancouver, B. C.

Dear Bill:

This will acknowledge receipt of three copies of your report - "Preliminary Assessments of Exploration Potential Adams-Ivanhoe-Whistler lode segments on Carnegie".

I note your comments re. distribution and Bill Hogg. I will make a copy of the report and send it to Bill but, we cannot reproduce the map No. P.C.-1. Would you send a copy of this map to Bill Hogg directly.

Essentially you suggest that the segment of the lode centering on Sandon Creek at elevation + 5,000 ft. may be a favourable target area, subject, of course, to further investigation.


For the time being, I don't think we will take any further action on this matter, other than to discuss the report with you when we next get together,

However, the current prices for silver, lead and zinc certainly make the Sandon area very attractive, as I'm sure you know, and we may be able to develop enough interest to allow for financing such a project.

Kindest regards,

Yours very truly,

KAM-KOTIA MINES LIMITED,



G. W. Walkey,
Vice-President and General Manager.

GWW/rk

WILLIAM M. SHARP, M.A.Sc., P.Eng.
CONSULTING GEOLOGICAL ENGINEER
171 W. ESPLANADE, NORTH VANCOUVER, B.C.

FEB. 27, 1973

DEAR MR WALKER:

PLEASE FIND ENCLOSED 3 REPORT-DRAWING SETS OF MY REPORT ON 'PRELIMINARY ASSESSMENT-EXPLORATION POTENTIAL--ADAMS-IVANHOE-WHISTLER LOBE SEGMENTS, SANDON PROPERTY, CARNEGIE MINING CORP.'

MAY I ASSURE YOU THAT MY STARTING INTENTION WAS TO HOLD THIS TO THE SUGGESTED 3 ± PAGES, HOWEVER, TO MAKE IT AT ALL INTELLEGIBLE, AND AT THE SAME TIME RE-STATE THE BASIC STRUCTURAL CONCEPTS, OUTLINE THE GEOLOGICAL FRAMEWORK OF THE SOUTH LOBE SYSTEM AND FOLLOW THROUGH FROM THERE, I CONSIDERED IT WOULD BE MORE SATISFACTORY TO JUST HOLD TO THE 1-WEEK LIMITATION. I HOPE YOU AGREE!

DURING A TALK WITH BILL HOGG TODAY WE DISCUSSED DISTRIBUTION FROM THIS END, AND AGREED THAT IT WOULD BE BEST TO SEND THE ENCLOSED 3 COPIES TO YOU SO THAT, IF YOU SO DECIDE, YOU CAN MAIL ONE TO BILL WITH COVERING NOTES CONCERNING THE CONTENTS.

I WILL BE THE FIRST TO AGREE THAT, IN SPITE OF ITS LENGTH, THAT THIS REPORT CAN ONLY BE TAKEN AS A PRELIMINARY ANALYSIS OF THE GEOLOGY AND POTENTIAL OF THE SOUTH LOBE SYSTEM; HOWEVER, I HOPE THAT IT WILL AT LEAST BE CONSIDERED AS A 'GOOD START' ON THE PROBLEM.

YOURS VERY TRULY,

W. M. Sharp.

ENCL.

File Carnegie Mining Corp.

TEL: BUS. 987-5322

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WILLIAM M. SHARP, M.A.Sc., P.ENG.
CONSULTING GEOLOGICAL ENGINEER
171 W. ESPLANADE, NORTH VANCOUVER, B.C.

*Drawings of X-Sections
A-A₁, B-B₁, C-C₁, D-D₁
w. Aug P.C-1 in map
drawer.*

Carnegie Mining Corp.,
c/o Mr. G.W. Walkey, V.P. & Gen. Mgr.,
Kam-Kotia Mines Ltd.
Suite 416 - 25 Adelaide Street West,
Toronto 1, Ontario

Feb (27), 1973.

Gentlemen:

PRELIMINARY ASSESSMENT - EXPLORATION POTENTIAL
of the
ADAMS - IVANHOE - WHISTLER LODE SEGMENTS
within the
SANDON PROPERTY OF CARNEGIE MINING CORP.

INTRODUCTION

The current report is largely based on records of surface and underground geological studies by Carnegie staff during 1953-54 and of cross-cut and diamond-drill exploration of the South lode system at, and closely above Silversmith No. 10 horizon. Other references comprise maps compiled by the Kelowna Exploration Company, G.S.C. and B.C.D.M. reports by C.E. Cairnes and M.S. Hedley respectively, and the writer's personal records and background experience. The writer and Mr. Walkey subsequently discussed some features regarding the geology of the various lodes traversing the Carnegie property and problems relating to the exploration of relatively unexplored, but potentially-mineralized portions of them. On the basis of this discussion, related correspondence, and the data made available Mr. Walkey asked the writer to furnish a report which would outline the exploration(ore) potential within Carnegie's ground and which might include specific exploration proposals and, if possible, some assessment of exploration possibilities - principally within the South lode system.

The Carnegie surface geological mapping, although very competently performed, does not have quite the coverage required for a broad interpretation of major bedding structures containing the 'South' lodes. A concurrent deficiency concerns their delineation of the topography which, beyond their transit-chain control, is partly based on pace-and-compass traverses and the earlier B.C. Dept. of Mines plane-table control. In an attempt to produce a broader and more accurate plan on a more convenient scale the writer compiled the accompanying map via the following steps:

- Aerial photo taken
base (approx?)
small detail even
more satisfactory*
1. Convert Carnegie 1"=200' map to 1"=400'.
 2. Convert local area Kelowna Ex. 1"=1200' map to 1"=400'.
 3. Convert Carnegie 1"=40' detail to 1"=400' and "composite the small structural detail.
 4. Combine and 'fit' the foregoing to produce the 1"=400' composite required for structural interpretation.
 5. Add relevant detail from Kel. Ex. Map No. 2 (1"=100') to the above composite plan.

The resulting 1" = 400' map enabled the writer to deduce the trace of the axial plane of the "Queen Bess" fold and permitted the construction of consecutive crosssections (attached) on the trace of the South lodes. To summarize, drawings with this report are:

Dwg. No. P.C. - 1, CrossSections AA, BB, CC, and DD.

LODES & PAST PRODUCTION:

(A) Main Slocan Lode

Within the Carnegie property this is represented, from west to east, by the following consecutive, productive lode segments - separated by formational (tangential) faults which, between 'offset' lode segments, are also mineralized (predom, Zns) over distances of a few feet to 100 feet or more from the offset ends of the above segments: Hope, New Ruth or 'West Silversmith', Silversmith, Slocan Star, and Richmond - Eureka.

The individual lode segments vary in strike from east to northeast; their average dip is about 45°. ^{Southern} Over its strike extent the gross width of the lode ranges from about 10 to 100 feet. Like other major lodes in the Slocan camp, it is a single to multiple-stranded fault structure. Lode fillings comprise shearedbrecciated wall rocks, which are more or less veined and/or impregnated by gangues composed of varied proportions of quartz, calcite, siderite, and pyrite. The gross structure is essentially a tearfault, along which hanging wall ground has shifted eastward and downward relative to footwall ground; locally, mullions and/or slickensides pitch from 0° to 40°. Economic concentrations of argentiferous galena and sphalerite - usually containing some tetrahedrite, tennantite, or 'ruby silver' - constitute the orebodies.

The recorded production from the separate orebodies within the Carnegie segment of the main lode is:

Orebody	Tons of Ore	@Ag, oz/ton	Pb, %	Zn, %
Hope	26,000	29.0	11.0	(?)
Silversmith & Ext.	227,000	17.0	6.6	3.8
Slocan Star	145,194	23.7	14.5	2.0(1)
RichmondEureka	42,535	19.1	6.2	2.2(1)

440,729

(1) Part of discarded Zn later recovered from mine dumps.

(B) Ivanhoe Lode

This structure has been traced, from west to east, from its outcrop on the north slope of Silver Ridge across Idaho Basin and Silversmith Ridge to a near - junction with the Adams lode some 400 feet west of Sandon Creeek. East of Sandon Creek it appears to diverge acutely from the Adams structure. Where exposed on the headwall bluffs of Ivanhoe Basin, the lode is an irregular zone of fracturing and shearing across a width of about 40 feet. To the west

of the Carnegie claims, and including its productive interval under Silver Ridge, it strikes a little south of west and has an average 45° dip to the south. It was productive over a vertical distance of 325 feet within the upper two-thirds of the vertical range of the mine workings. Within Carnegie's property it strikes easterly through Silversmith Ridge and across Sundon Creek; east of Sandon Creek, through Sandon Ridge it strikes N.E., then S.E., with dips as high as 80° south. Its strike-length within the property is about 5,000 feet.

Total recorded production is 44,416 tons @ Ag, 10.3 oz/ton; Pb, 5.9%; Zn, 0.8%. Records of Zinc production are incomplete; typically, this metal was sorted out of earlier mine production.

(C) Adams Lode

Like the Main lode, the Adams is a major district structure. Dwg. No. P.G. - 1 indicates a N.E. strike from Adams Peak to Silversmith Ridge; thence easterly to northeasterly trends, like the Ivanhoe lode, to and beyond its convergence with this structure. It's length within the property is also about 5,000 feet. Rare exposures indicate a uniformly steep southerly dip of 75°-80°. The lode is exposed only on Adams Peak and Sandon Ridge, and rather doubtfully indicated at one or two points on the Silversmith Ridge (and south fork of Sandon Creek?). Relative hanging wall/footwall displacement on this structure appears, on very indirect evidence, to exceed that on most other district lodes. Probably because it is exposed at only two points above timberline, and is obscured elsewhere by heavy drift and talus, it was not appreciably explored during the earlier years of mining activity in the camp. Recorded ore production is only 11 tons, containing 100 oz/ton silver and 50% lead.

Whistler Lode

Because of its weak appearance and local tendency to strand out on bedding planes, it should be probably classified as a 'minor lode.' It is exposed by (2) adits near Sandon Creek and tentatively, by the presence of shearing on Sandon Ridge. An easterly to northeasterly strike and steep southerly dips have been inferred. Its Sandon Creek exposures reveal 26 feet of graphitic gouge and sheared sediments; however nearby outcrops contain small lensy veinlets of quartz and carbonate (?). There is no record of production from this lode.

SUMMARY - GENERAL ORE CONTROLS

These are essentially structural, in that all are such as to lead to the creation of openspace or relatively - pervious conditions for the migration and localized deposition of minerals from ascending (?) metal-charged solutions.

- (a) Zones of intersecting or closely converging lode strands.
- (b) Zones of lode/formational fault intersections.
- (c) Warps or bends related to changes of strike and/or dip

- (west-dipping) panels of rock of differing competence or hardness.
- (d) Lode intervals where the walls consist of moderately to steeply west-dipping beds of mixed competence or hardness, and which tend to produce lode-breccias rather than gougy ^{or schistose - graphitic} fillings.
 - (e) Where the lode situates over porphyry or strong quartzites and within a lode-conformable panel of bedding of physical character such that it will arch or crumple to produce open-space conditions where traversed by a lode.
 - (f) Miscellaneous.

GENERAL LITHOLOGY

Most of the map area is underlain by relatively competent assemblages of quartzite, limestone, argillite, and mixed varieties of these rock types. Assemblages may change in character, ^{within 1000' or so} on strike and dip, because of original shallow-water conditions of sedimentation.

From his mapping of (principally) underground and surface bed-rock exposures S.J. Pedley delineated the following assemblages within the Carnegie claims:

- (a) Silversmith hanging wall: 600'-800' wide porphyry 'sill' - flanked by generally competent limy quartzites and (variably quartzitic) argillites.
- (b) Slocan Star hanging wall: 1600'- wide panel of quartzites and argillites.
- (c) Richmond- Eureka hanging wall: 800'-wide panel of mixed quartzites, argillites, and limestones.

Much of Silver Ridge is underlain by strongly bedded argillites, quartzites, and limestones, however, the information at hand reveals little about the lithology of the upper Sandon Creek and Basin areas.

The assemblages comprising (a) (b) and (c) above probably extend southward to form the footwalls of the Whistler and Adams lodes. In view of the major displacement on the Adams lode, the above units should occur several hundreds of feet eastward in the ^{hanging} footwall of the Adams-Ivanhoe lode.

The 'Sandon Basin' porphyry bodies, in the hanging wall of the Sandon Creek interval of the (Adams) Ivanhoe lode may furnish similar hanging wall conditions for mineralization as existed within the productive 'Silversmith' segment of the Main lode.

PRINCIPAL BEDDING STRUCTURES

- (a) North of Adams Lode:

The 'block' of sediments bounded on the north and south, respectively, by the Main lode and Admams lode has been strongly folded and faulted on both the strike and dip of the constituent beds - this being most pronounced in sections containing a high proportion

of thinly-bedded argillaceous rocks. General reversals of bedding dips at approximately the 4,000' and 5300' elevations respectively are interpreted as being at the crestal and approximately - horizontal axial-plane regions of the 'Payne' and 'Queen Bess' sub-elements of the general Slocan Fold. The west-dipping panel of bedding between the above crest-planes comprises the so-called 'optimum panel' for mineralization along lodes within the most productive areas of the camp. However, this constitutes only a relatively general structural control. In most cases, and in respect of their vertical extent, most orebodies tended to situate within either one or other crestal region and the adjacent section of more-or-less west-dipping beds. This is indicated by the relative positions of the Hope, Silversmith, and Richmond-Eureka orebodies on the Main lode. In this respect, the Slocan Star orebody may have been unique, in that it may have extended continuously from the 'Payne' to the 'Queen Bess' crest-prior to the possible erosion of its upper 400-500 feet. (fold)

→ Within the block of sediments between the Main ^{lode} and Adams-Ivanhoe lodes the crestal section and lower limb of the Queen Bess (loc. Richmond-Eureka) fold appear to be present. Also, the axial plane of the fold appears to situate at about the 5300' elevation. This axial position is within 200-300 ft. of its elevation at other rather widely-separated mapped localities along the course of the Main lode, which fact suggests that perhaps too much weight has been placed on the theory that the plunges of all minor drag folds are indicative of the plunges of the major fold structures to which they are related.

The position of the Queen Bess axial plane shown on the map relates to the bedding section in the footwall of the Whistler (minor) lodes and probably lies at much the same elevation within the footwall beds of the Adams - Ivanhoe lode. However, with a major eastward and downward relative hanging wall displacement on the latter and the absence of sufficient direct evidence, the Q.B. axial plane may be inferred to situate at a significantly lower elevation within the folded bedding section in, or south of the hanging wall of the lode. This probability should be weighed along with other physical factors during the selection of the most optimum horizon for exploration. The selection of specific strike and dip intervals for detailed sub-surface exploration would be based on the results of reconnaissance - to - detailed geological mapping, geochemical tracing and, possibly, concurrent and/or followup trenching. Currently, the preliminary geological mapping and interpretations by Carnegie suggest that the main ore potential within the South lode system might occur, strike-wise, between points situating 1000 ft. west and 1500 ft. east/northeast of its general intersection with Sandon (main) Creek - this inference being based on indications of such favourable supplementary ore controls as porphyry hanging walls, convergent lode strands, steep dips, and a pronounced counter-clockwise bend in the strike of the lode.

COMMENTS PREVIOUS EXPLORATION

The following notes refer to certain debateable geological concepts of the Carnegie staff, and to specific exploratory work carried out by that company.

1. Tangential faults and lodes: It was thought that fault-separated ore segments were parts of the same original orebody and that the "apparent" displacements were indicative of "throws" of perhaps 500-1000 feet (ie., Main and West Silversmith orebodies). Actually, the major tangential faults and the lodes are essentially conjugate structures, and the displacements observed had been very nearly accomplished by the time mineralization commenced. Instances where lode mineralization is seen to "tail" into fault zones provides the best evidence of this fact. Some post-ore displacements on tangential faults occurred, but, generally, these were of relatively minor magnitude.

2. Position of Major Recumbent Folds: These did not develop in the upper limb of the main Slocan fold; the prevailing opinion is that they perhaps relate to its central region, and that its upper limb has been largely removed by erosion.

3. Plunges of Major Folds: These have been deduced from measurement of plunges of minor dragfolds, and are inferred to plunge at 20° southerly towards the footwall of the South lode system. Actually the interpreted (map) plunge is 10° or less, with the elevation of the Queen Bess crest at the Whistler lode being about the same as its interpreted position at the Hope interval of the Main lode. The minor drag folds throughout a bedding section are assumed to relate to pure dip-slip inter-bed movements and consequently plunge the same as the major fold in which they occur. However, it is possible that concurrent strike-slip displacements have caused an over-rotation of some drag fold axes to locally produce anomalously steep plunges.

4. Exploration of the West Silversmith Lode Segment:

On the assumption that this was the down-faulted extension of the Silversmith orebody, it was explored by 2 fans of holes drilled downward from the West Silversmith workings. The results gave no indication of better mineralization at depth, and generally showed that the above noted assumption was incorrect.

5. Depth Exploration, South Lodes

This was accomplished by driving 10-51 X-C on a S.S.E. to south bearing for 2870 ft. and drilling upward from stations at the face and at about 350 ft. back of the face. None of the drill holes intersected significant mineralization. X-Sec. A-A indicates that two weak, very sparsely mineralized structures intersected by the cross-cut may be the Adams and/or Ivanhoe lodes - excluding the possibility of an unrecognized drill-hole intersection due to coring losses. However, in view of the importance and cost of the project it would appear that additional drill holes to test the structures well to the east and west of, and above the cross-cut would have been warranted at that time.

Also, it is obvious that bedding structures to the north and south of the Main lode must be significantly different, and that an east-dip panel of bedding in the zone of the cross-cut was certainly not anticipated.

EXPLORATION PROBABILITIES & LIMITATIONS

As noted previously, the preliminary geological compilation indicates that the Carnegie segment of the South lode system comprises a significantly better-than-average exploration bet. This evaluation is based on the presence and/or co-occurrence of three to four favourable local structural situations within a generally favourable structural framework. With this, the scale of the smallest of the possible ore controls is such that one could anticipate the existence of an ore block with a 400 foot strike-length, a similar dip extent, and 5 foot mining width, including dilution. Assuming that a little better than 60% of this would comprise minable ore, the net tonnage potential would be about 50,000 tons. On the basis of the recorded grade of the Ivanhoe production, it would appear safe to forecast an after-tax ~~rx~~ profit potential of \$20 per ton.

The exploration area above the 5000' contour on Sandon Cr. is relatively close to Sandon within an apparently moderate topographic setting; hence, subject to ~~ax~~ ground checks, the area is considered easily accessible on both a general and a local basis.

EXPLORATION PROPOSALS

PHASE I

- (1) Rehabilitate access road and brush out trail.
- (2) Establish transit-chain survey control.
- (3) Carry out detail geological surveys via Brunton-tape.
- (4) *Square - one approach* Perform geochemical-feasibility investigation. *incl. soil, rock-chip & wash-chip for background*
- (5) Establish lines and carry out detailed geochemical survey. *incl. soil, rock-chip & wash-chip for background (progenitor?) samples Ag, Pb, Zn, Cu, S, B)*
- (6) Prospect geologically and geochemically-indicated target sections along lodes by trenching.
- (7) Explore sub-surface target zones via a preliminary diamond drill program. *(Cu, S, B)*

PHASE II (Contingent on results of Phase I exploration).

- (1) Carry out additional (localized) diamond drilling.
- (2) Drive a cross-cut and laterals as required for detailed underground diamond drill exploration.

Estimated Costs:

PHASE I:

(1)	Provisional estimate		\$	1,500
(2)	Estimate 4 man-days line-cutting	\$100		
	" 2 days transitman	150		
	" 2 " survey helper	50		300
(3)	Estim. 5 days geologist, gross	750		
	5 " geologist asst.,	200		950
(4)	Provisional estimate			450
(5)	Estimate 200 samples @\$5.00 gross			1,000
(6)	Provisional estimate			1,000
(7)	" " 2500' @ \$13/ft.			32,500
	Provision, general engineering & supervision			1,500
	" , transportation			500
	" , miscell. equip. & supplies			750
	" , contingencies & gen. expense			4,050
	Total, Phase I		\$	44,500

PHASE II

(1)	Provisional estimate, 3000' @\$13/ft.		\$	39,000
(2)	" " , 3500' @100/ft. gross			350,000
	Provision, contingencies & gen. expense			40,000
	Total, PhaseII		\$	429,000
	Total Phase I and II			\$473,500

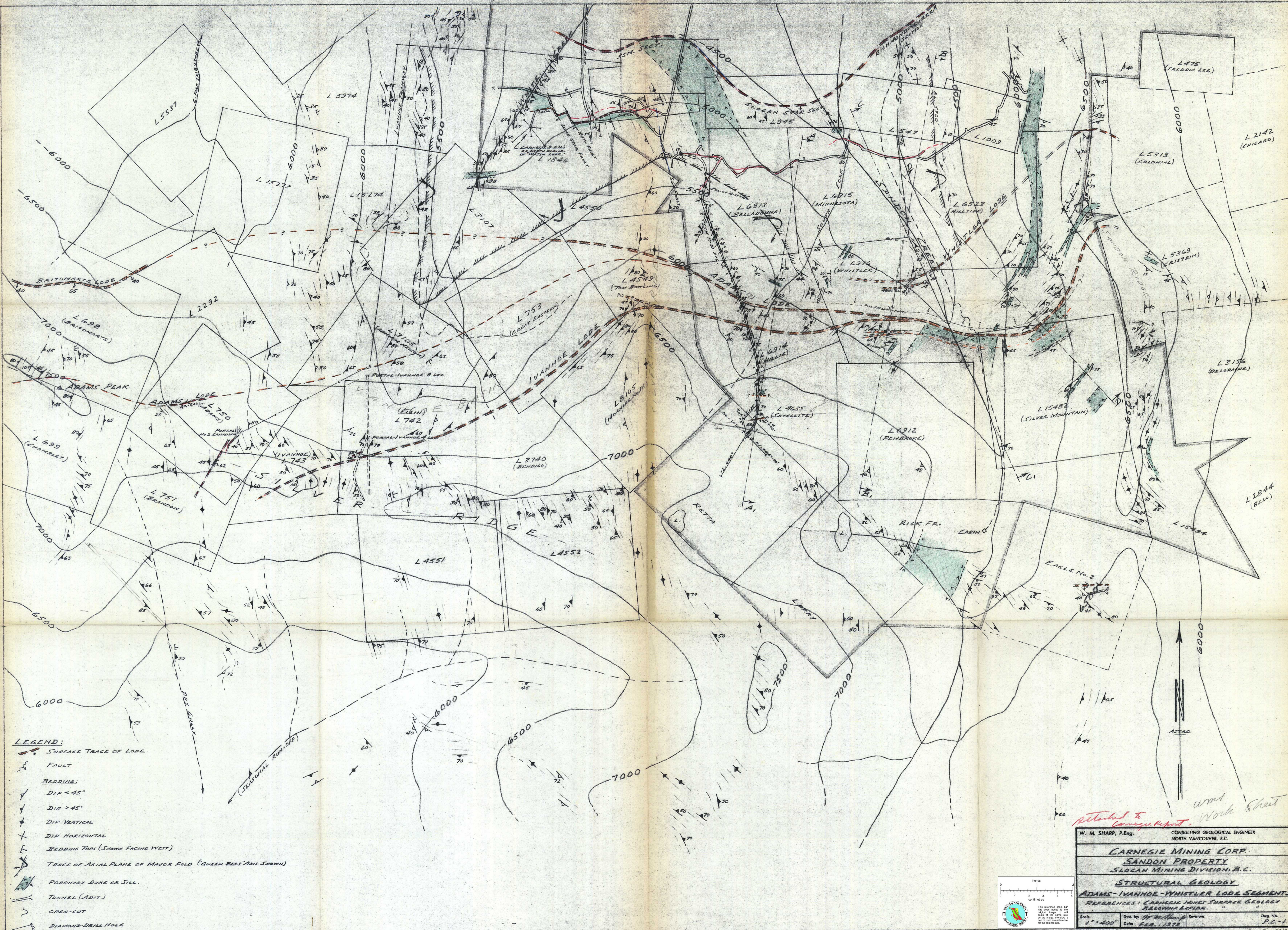
PRELIMINARY FEASIBILITY ESTIMATE

Projected net earnings, 50,000 tons x \$20	\$ 1,000,000
Total, Phase I & II - \$473,500	
Financing charges etc. 100,000	\$573,500
Approximate gross return	\$426,500

Respectfully submitted,

W.M. Sharp, P. Eng.

WS/az



- LEGEND:**
- SURFACE TRACE OF LODE
 - FAULT
 - BEDDING:**
 - DIP $\le 45^\circ$
 - DIP $> 45^\circ$
 - DIP VERTICAL
 - DIP HORIZONTAL
 - BEDDING TOPS (SHOWN FACING WEST)
 - TRACE OF AXIAL PLANE OF MAJOR FOLD (QUEEN REE'S ANT SYNCLINE)
 - PORPHYRY DYKE OR SILL
 - TUNNEL (ADIT)
 - OPEN-CUT
 - DIAMOND-DRILL HOLE

Work Sheet

Attached to Carnegie Report

W. M. SHARP, P. Eng.	CONSULTING GEOLOGICAL ENGINEER NORTH VANCOUVER, B.C.
CARNegie MINING CORP.	
SANDON PROPERTY	
SLOAN MINING DIVISION, B.C.	
STRUCTURAL GEOLOGY	
ADAMS-IVANHOE-WHISTLER LODE SEGMENTS	
REFERENCES: CARNegie MINES SURFACE GEOLOGY REGIONAL MAPS.	
Scale: 1" = 400'	Dwn. By: W. M. Sharp
Date: FEB. 1935	Revision: P.G.-1

