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REPORT

DEVELOPMENT & PRODUCTION FEASIBILITY STUDY SILMONAC MINE & PROPERTY NEW DENVER, B.C.

MAY, 1977 W.M. SHARP, P.ENG.

SOBOLEWSKI, ANFIELD & REE

BARRISTERS & SOLICITORS

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(604) 669-1322

December 30th, 1977

William M. Sharp, Esq.
Consulting Geological Engineer
3280 Chesterfield Avenue
North Vancouver, British Columbia
V7N 3M9

Dear Sir:

RE: Silvana Mines Inc. (formerly
Silmonac Mines Limited (N.P.L.))

We act as solicitors for Silvana Mines Inc. and have submitted documents to the Vancouver Stock Exchange and the British Columbia Securities Commission relating to a new proposed Underwriting.

We have filed with the Vancouver Stock Exchange and the British Columbia Securities Commission your Report of May 8th, 1977 and your supplemental Report of October 18th, 1977.

However, a Certificate of Independence and Qualifications will be required to be submitted in the usual form as required for a Prospectus. We would appreciate if you could prepare such a Certificate and forward four copies to us at your convenience and also forward to us your authority to attach them to your Report of May 8th, 1977 and your supplemental Report of October 18th, 1977.

If you have any questions on the above, please do not hesitate to advise.

Yours very truly,

SOBOLEWSKI, ANFIELD & REE

S. DAVID ANFIELD

SDA/cm

TEL.: BUS. 987-5322
RES. 987-9520

WILLIAM M. SHARP, M.A.Sc., P.Eng.
CONSULTING GEOLOGICAL ENGINEER
3280 CHESTERFIELD AVENUE
NORTH VANCOUVER, B.C. V7N 3M9

May 9, 1977 Sept. 16, 1977

Subst:

British Columbia Securities Commission
Bank of British Columbia Building
756 Fort Street
VICTORIA, B. C.

Ontario Securities Commission
Toronto, Canada.

Gentlemen:

RE: "REPORT-DEVELOPMENT & PRODUCTION
FEASIBILITY STUDY OF THE SILMONAC
MINE & PROPERTY NEAR NEW DENVER, B. C.
IN THE SLOCAN MINING DIVISION

The undersigned hereby gives his consent to the use of the full report, or of its full section "Summary & Conclusions/ Recommendations/Estimated Costs" by the Board of Directors of Kam-Kotia Mines Limited for the purpose of providing public information concerning the property, the currently recommended work program, and cost estimates relating to the latter.

Yours truly,

W. M. Sharp

W. M. SHARP, P.Eng.

WMS:ja

TEL.: BUS. 987-5322
RES. 987-9520

WILLIAM M. SHARP, M.A.Sc., P.Eng.
CONSULTING GEOLOGICAL ENGINEER
3280 CHESTERFIELD AVENUE
NORTH VANCOUVER, B.C. V7N 3M9

May 8, 1977

The Board of Directors
Kam-Kotia Mines Limited
#1402 - 390 Bay Street
TORONTO, ONTARIO
M5H 2Y2

Attention: Mr. G. W. Walkey,
Vice President & General Manager

Gentlemen:

Pursuant to our preliminary discussions and the authorization and terms of reference provided by your recent letter, I am pleased to submit, herewith, my "REPORT, DEVELOPMENT & PRODUCTION FEASIBILITY STUDY, SILMONAC MINE & PROPERTY, NEW DENVER, B. C., SLOCAN MINING DIVISION".

All of the helpful assistance and pertinent information provided by Kam-Kotia management and mine staff is much appreciated, and is hereby thankfully acknowledged.

Yours very truly,

W. M. SHARP, P.Eng.

WMS:ja

REPORT

ON A

DEVELOPMENT & PRODUCTION

FEASIBILITY STUDY

NEAR

NEW DENVER, B. C.

IN THE

SLOCAN MINING DISTRICT

FOR

KAM-KOTIA MINES LIMITED

TORONTO, ONTARIO

BY

W. M. SHARP, P.Eng.
NORTH VANCOUVER, B. C.

AND SUBMITTED IN

May, 1977

INDEX

INDEX (Continued)

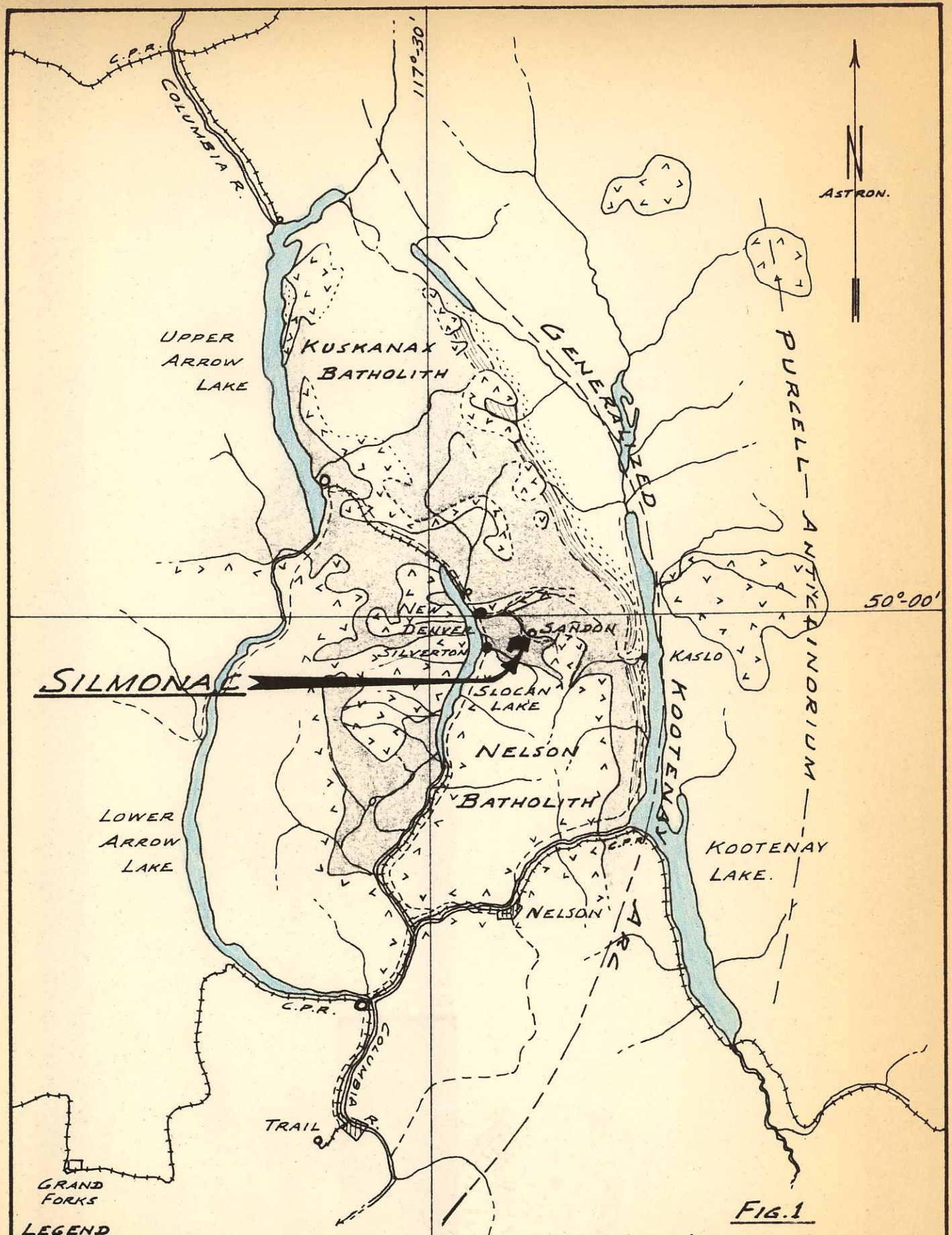


FIG. 1

INDEX MAP
&
GENERAL GEOLOGY
SILMONAC MINES LTD (NPL)
NEW DENVER, B.C.
SLOCAN MINING DIVISION
SCALE: 1 IN. = 15.8 MI. FEB., 1977

SUMMARY & CONCLUSIONS

The Silmonac mine, a producer of high grade silver-lead and silver-zinc concentrates since 1970, situates within the central and most productive part of the Slocan mining district. The mine workings locate near the east end of the property which consists of one block of 68 contiguous Crown-granted claims. The Silmonac claim block fully covers a two mile length of the Main Slocan lode which at current metal price levels, has produced ore and concentrates with a gross recovered value exceeding 210 million dollars. This production, deriving from about 10 large and small mines, accounts for some 74% of the total production of the main Slocan mining area. The Silmonac claims cover two miles of the six mile mined length of the Main Lode.

To date, the extent of the Silmonac mine workings is such that they have explored only a 2,000 feet strike-length of its known and potentially productive two mile length within the property. Within this 2,000 feet length, a range of 600-1,000 feet of potentially productive lode presently exists as unexplored dip extensions.

Thus far, the mine has produced over 140,000 tons of ore. All of this has been concentrated at the Company controlled and operated mill at Sandon, which is only three miles from the mine and, as presently set up, has the capacity to handle up to 4,000 tons of ore per month. Most of the above production has come from now depleted ore bodies above the 4,625 main working/haulage level. During the past two years an increasing proportion (now 100%) of mine production has come from ore zones lying down-dip of the 4,625 level. These were discovered by diamond drilling, at a maximum effective range, from workings in the hanging wall of the lode at 4,625 level.

Ore below 4,625 level has been developed and mined through minus 15% declines. However, the length of the East decline now exceeds the distance at which the L.H.D. equipment can cope with production

requirements, and the West decline is rapidly approaching this point. The present situation is such that unless a major development program is carried out to provide a better way of moving ore to the surface, operations will gradually become uneconomic due to the diminishing 'capacity' of the present L.H.D./decline mining system.

The Main lode, where it occurs within the Silmonac property, is a strong, composite shear zone 10 to 40 feet or more wide. Striking easterly to northeasterly, and with a generally small southerly dip, it traverses complexly folded assemblages of argillite, quartzite, limestone, and porphyry. The most productive section of it, in which silver-lead-zinc mineralization has been mined over widths ranging from five feet to, locally, 20 feet, is a pinching and swelling band of fractured to crushed wall rocks cemented by quartz, calcite, siderite, and ore minerals in varying proportions.

On the basis of the limited amount of drilling that could be accomplished within the Company's operating budget, three ore blocks have been indicated. Together these comprise the current 'Probable' ore reserve, estimated to be 48,855 tons @ 16.43oz/ton Ag.,5.8% Pb, 5.9% Zn(+Cd).

The real future of the operation is predicated on the ore potential, or 'Possible' ore reserves residing in the 7,000 foot unexplored extension of the lode to the west of and, mainly, below the Silmonac 4,625 haulage level. The current estimates of these reserves are based on the statistical probabilities of their occurrence within the geologically optimum vertical interval of the lode. As a result, it is estimated that:

> 'Possible' or 'Potential' ore reserves are approximately 500,000 tons @ 16.43 oz/ton Ag, 5.8% Pb, 5.9% Zn (+Cd) -- the grade assigned being that of the average of the gross mine production to date. At a long-term average production rate of 36,000 tons/year, a 14 year life is indicated.

The net recoverable value of ore of the above grade, and which includes the 1970-75 average amount of mining dilution, is estimated to be $104.70 per dry ton at current metal price levels. A much more conservative valuation of the ore reserves might warrant some provision within the current estimates for the lowest mineable grade that might be encountered during some period in the 'life' of the operation. This, in accordance with past production records, could be represented by a grade possibly amounting to about 3/4 of that of the ore reserve figure --- resulting in a net recoverable ('mill value') of 3/4 x $104.70 = $78.52 per dry ton and 4/3 x 14, or approx. 18 1/2 year 'mine life'.

For ore with the above $104.70/d.t. and $78.52/d.t. mill values, the projected net cash flows, at the production rates shown and over the respective 14 year and 18 1/2 year 'mine'lifes' which are possible.

Production Rate, Dry Tons per Month	Estim. Range of Net Cash Flows per Mo.	Estim. Range of Net Cash Flows per Year
1,500	$ 10,410 to $ 49,680	$ 124,920 to $ 596,160
2,500	$ 57,850 to $123,300	$ 694,200 to $1,479,600
3,500	$106,365 to $197,955	$1,276,380 to $2,375,460

The term 'net cash flow', as used throughout this report is defined as the revenue from concentrates sold minus the total mine and mill 'cash' or operating costs. Further, 'net cash flow' is equivalent to the 'net operating profit' shown on the mine accounting reports. From this figure, the permissable and required deductions such as depreciation, processing, and depletion allowances, income taxes, and capital investment (pro-rata basis) are made in order to determine the cash flow generated by the operation.

While the proposed new low-level ('4,000-level') general plant installation/rehabilitation/development project is underway, a production rate of 2,000 tons per month should be possible. At about two years after the completion of this project, a production rate of 3,500 tons per months should be maintained.

Following the completion of the development program that would most nearly optimize exploration, development, and production operations, and earnings, it is expected that average production rates in the range of 36,000 - 48,000 tons per year will become increasingly feasible. On the basis of this, and the possibilities of increasing both the profitability and life of the operation, the writer considers the necessary time and capital expenditures are fully warranted; hence, the general recommendations made below should be carried out either in the suggested sequence, or in whatever one best fits the requirements of an on-going mining operation.

RECOMMENDATIONS

STAGE I

Install the required surface mine plant on the 4,000 level portal bench; rehabilitate the existing 4,000 level drifts and crosscuts; drive additional crosscut to a point underneath main 4,625 crosscut; extend West decline to point below 4,625 crosscut at 4,400 elevation, drive muck and service/ventil. raises to 4,400 elevation.

STAGE II

Drive 2,500 feet of 8' x 10' explor./develop. laterals to prepare indicated ore blocks for extraction.

STAGE III

Carry out follow-up exploratory work,as required.

ESTIMATED COSTS

STAGE I

To rehabilitation of access road and portable bench	$ 1,000
Purchase and install surf. and undgd. mine plants	156,200
Rehabilitate existing main-line drifts and crosscuts on Silmonac 4,000 level	64,200
Provision for 'detour' tunnels on 4,000 level, 300' @ $85/ft.	25,500
Drive 800' of 7' x 7' crosscut from inner end of 4,000 level, incl. allowance for timber, 800' @ $95/ft.	76,000
Extend W. decline to 4,400 elevation, 800' @ $110/ft.	88,000
Drive 5' x 5' muck pass to 4,400 elevation, 350' @ avg. $65/ft.	22,750
Drive 6' x 10' service/vent rse. to 4,400 elevation, 350' @ avg. $175/ft.	61,250
Sub-total, Direct Expense	$494,900
Provision for contingencies and extras, @ 20%	100,000
Provision for camp for single men	90,000
General provision for mill, waste control, etc., 10%	65,000
TOTAL STAGE I	$750,000

STAGE II

Min. provision, 2,500' of 8' x 10' tunn @ $100/ft	$250,000

STAGE III

---- open ----

Respectfully submitted

W. M. Sharp, P.Eng.

INTRODUCTION

The writer has prepared this report as a result of the formal request and authorization received by letter from Mr. G. W. Walkey in January, 1977. This and subsequent letters from Mr. Walkey instructed the writer concerning the scope and purpose of the report, in addition to providing much background information, technical data, and observations relating to the Silmonac mine operation and property. Essentially, the purpose of the report is to provide a geologically and statistically based estimate of the ore potential of the Silmonac property, and to present a logical plan for a development program that will initially maintain, and ultimately increase mine production and profitability.

General geological references consulted in the preparation of this report comprise G. S. C. Memoirs 173 and 184, by C. E. Cairnes, pertaining to the general geology, mines, and prospects of the Slocan Mining Camp' and B. C. Dept. of Mines Bull. No. 29, by M. S. Hedley, which describes the general geology, detailed geology, and principal mineral deposits of the 'Sandon Area' --- and pre-dating the discovery of the Silmonac ore bodies. Features of the geology and former ore deposits of properties along the Main Slocan Lode, other than Silmonac, were derived from geological maps resulting from investigations and operations that had been carried out by Western Exploration Co., Carnegie Mines, the former Kelowna Exploration Co./Kelowna Mines Hedley Ltd., and others. However, information pertaining to the geology, operations, and production of the Silmonac mine property -- and which comprises the major part of this report -- derives from the writer's working files, from the mine office files and, particularly, from recent in-house reports and estimates prepared by Kam-Kotia management and staff.

The writer's background of experience in the Slocan mining area dates from 1946, and stems from his personal involvement with it, as follows:

1946-50 - Field geologist with Kelowna Exploration Co. Ltd. on regional mapping and detailed investigations of several mining properties in the area.

1954-57 - Successively mine geologist and resident manager at the Violamac (Victor) mine near Sandon.

1964-present - Consulting or advisory geologist on the Silmonac mine operation -- with this involving periodic visits, commencing from the initial stages of exploration of the property. During this general period the writer was closely associated with the exploration and development of the Silmonac ore zone. During this general period the writer also examined and reported on some half-dozen other properties within the general Slocan mining area.

The writer's most recent visit to the Silmonac mine was made during the week of February 7-14, 1977. During this visit the writer up-dated his file of mine maps and records, discussed current underground exploration, development, and mining operations with the management, and inspected development and mining operations in progress below the 4,625 (current main haulage) level.

A large part of the time spent on preparing this report was devoted to the compilation of the accompanying drawings. This involved the consolidation of detail contained in various 20-scale mine-maps, pantographic and photographic reductions of these to appropriate scales the preparation of suitably - scaled maps of other properties on the Main lode -- and for which there was no single source of information, and the construction of adequately detailed illustrative sections from the above noted drawings. In addition, a significant amount of time was spent on the consolidation of economic-geological data from various sources, and in the reconciliation of the various interpretations of it that have been made from time to time.

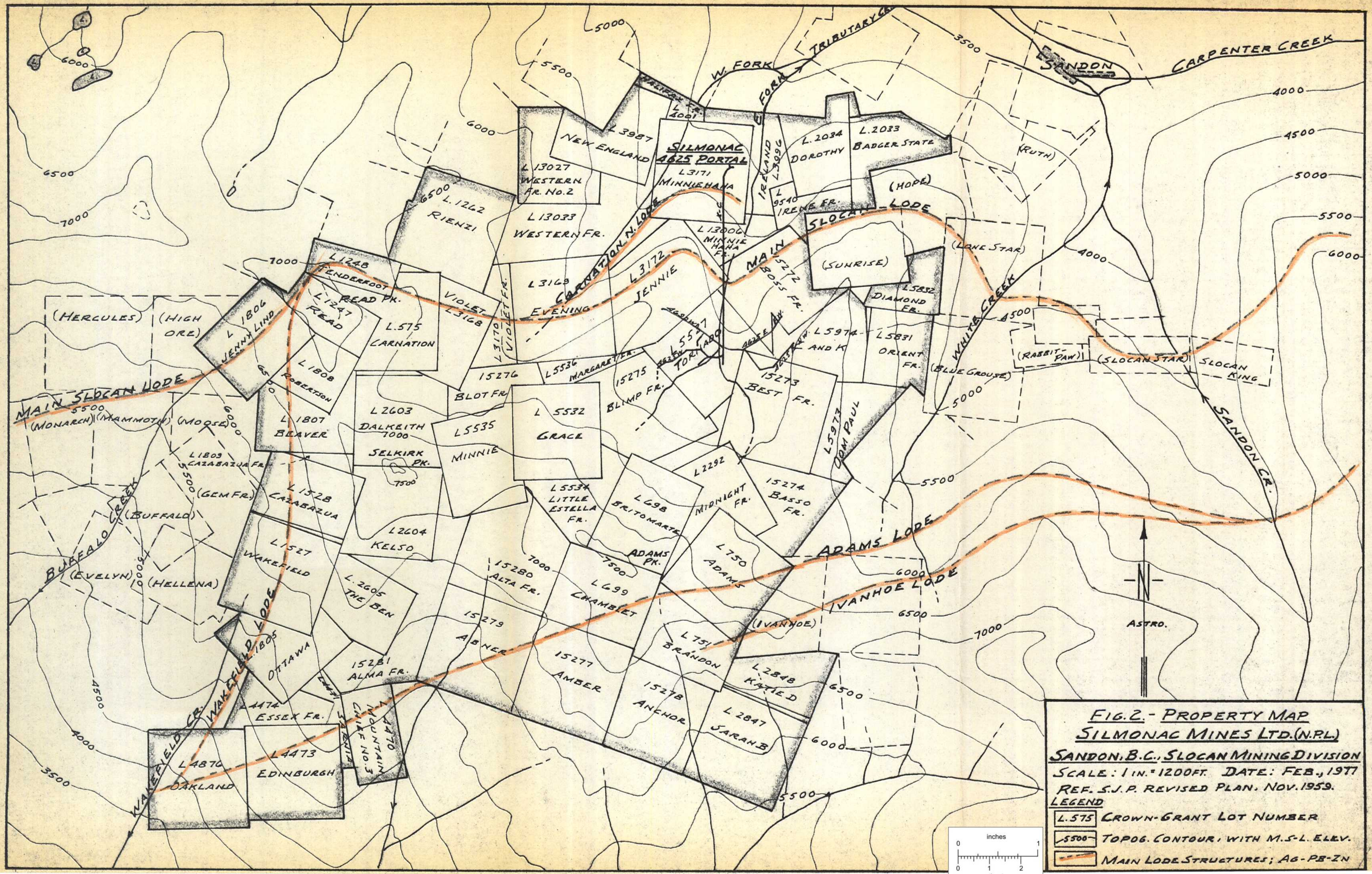

CARPENTER CREEK
SANDON
TRIBUTARY CR.
W. FORK
E. FORK
HALIFAX FR. L. 4001
L. 3987 NEW ENGLAND
SILMONAC 4625 PORTAL
L. 3171 MINNIEHAHA
IRELAND L. 3996
L. 2034 DOROTHY
L. 2033 BADGER STATE
(RUTH)
(HOPE)
L. 9540 IRENE FR.
L. 13027 WESTERN FR. No. 2
L. 1262 RIENZI
L. 13033 WESTERN FR.
L. 13006 MINNIE HAHA FR.
SLOCAN LODE
(SUNRISE)
(LONE STAR)
MAIN LODE
L. 5272 BOSS FR.
L. 5832 DIAMOND FR.
CARNATION N. LODE
L. 3172 JENNIE
L. 3169 EVENING
L. 1248 PENDERROOT
READ FR.
L. 1247 READ
L. 575 CARNATION
VIOLET L. 3168
L. 3170 VIOLET FR.
(HERCULES)
(HIGH ORE)
L. 1806 JENNY LIND
L. 1808 ROBERTSON
MAIN SLOCAN LODE
(MONARCH)
(MAMMOTH)
(MOOSE)
L. 1807 BEAVER
L. 2603 DALKEITH
SELKIRK FR.
L 5535 MINNIE
L. 5532 GRACE
15276 BLOT FR.
L. 5536
MARGARET FR.
15275 BLIMP FR.
L. 5537 TORNADO
L 5974 L AND K
L. 5831 ORIENT FR.
15273 BEST FR.
L. 5973 OOM PAUL
WHITE CREEK
(RABBIT-PAW)
(SLOCAN STAR)
SLOCAN KING
(BLUE GROUSE)
SANDON CR.
L. 1803 CAZABAZUA FR.
(GEM FR.)
L. 1528 CAZABAZUA
(BUFFALO)
BUFFALO CREEK
(EVELYN)
(HELLENA)
L. 1527 WAKEFIELD
L. 2604 KELSO
L. 2605 THE BEN
L. 5534 LITTLE ESTELLA FR.
L. 698 BRITOMARTE
L. 2292 MIDNIGHT FR.
15274 BASSO FR.
ADAMS PK.
L. 750 ADAMS
ADAMS LODE
IVANHOE LODE
(IVANHOE)
15280 ALTA FR.
L. 699 CHAMBLET
15279 ABNER
15277 AMBER
L. 751 BRANDON
L. 2848 KATIE D
15278 ANCHOR
L. 2847 SARAH B
15281 ALMA FR.
L. 1805 OTTAWA
WAKEFIELD LODE
WAKEFIELD CR.
L. 4474 ESSEX FR.
L. 4470 MOUNTAIN CHIEF No. 3
L. 4870 OAKLAND
L. 4473 EDINBURGH
N
ASTRO.
3500
4000
4500
5000
5500
6000
6500
7000
7500

FIG. 2. - PROPERTY MAP
SILMONAC MINES LTD. (N.P.L.)
SANDON, B.C., SLOCAN MINING DIVISION
SCALE: 1 IN. = 1200 FT. DATE: FEB., 1977
REF. S.J.P. REVISED PLAN. NOV. 1959.

LEGEND
- L. 575 CROWN-GRANT LOT NUMBER
- 5500 TOPOG. CONTOUR; WITH M.S.L. ELEV.
- MAIN LODE STRUCTURES; AG-PB-ZN

inches 0 1
0 1 2 centimetres
This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.

PROPERTY

LOCATION & ACCESSIBILITY

The current mine plant and main haulage level portal situate at the 4,625 foot elevation on the south slope of Carpenter Creek valley, at approximately one line-mile W.S.W. of Sandon, B. C. From Sandon, the property is reached by approximately three miles of good gravel road. Sandon connects with B. C. Highway 6 at New Denver by about 8 miles of mainly paved public access road.

The Company's ore milling, assay, and tailings - disposal facilities are located next to Carpenter Creek within an area closely west of Sandon (el. 3,500') and 3 road-miles from the 4,625 portal plant.

The old Ruth No. 5 portal area, and site of the contemplated surface plant for the low-level (4,000' el.) development of the Silmonac mine, is reached by two miles of all-weather road originating from Sandon.

CLAIMS

These, designated by name and Lot No., are shown on Fig. 2 -- bound with the text of this report.

The property comprises one roughly rectangular block of 65 contiguous Crown granted claims and fractional claims, including three held under lease. From its northeast corner, at 1/4 mile S.W. of Sandon, the block extends southwesterly along the south slope of Carpenter Creek valley, over the crest of Silver Ridge (el. 7,000 - 7,500'), and down the north slope of Silverton Creek valley. A centrally situated two mile strike - length of the 6 mile productive length of the Main (Slocan) lode traverses the Silmonac property. The Silmonac mine workings occupy a 2,000 foot partly developed length of the two mile long segment.

Former major producing mines on segments of the Main lode to the southwest and northeast of the Silmonac section of it comprise the Standard, Mammoth, Hope, Silversmith - Slocan Star, and Richmond-Eureka.

TOPOGRAPHY & CLIMATE

The property is situated within a relatively rugged part of the Selkirk Mountains. Locally, the claim group straddles Silver Ridge, which comprises the height of land between the Carpenter Creek and Silverton Creek drainage basins; as a consequence, topographic relief exceeds 4,000 feet. However, hill slopes are only very locally too steep for foot travel, with most of the truly inaccessible ones occurring within the 'alpine' areas above 'timber-line' at approximately the 6,500 foot elevation.

Below timberline, a heavy mantle of overburden is prevalent -- particularly over the north-sloping section of the claims area, and which includes the outcrop or 'trace' of the Main lode. This cover ranges from a few feet to more than 30 feet in depth, consisting mainly of firm boulder-clay (till) with a variable, but generally thin cover of raw soil and bedrock fragments. In addition, most areas within the 'sub-alpine' parts of the property, particularly the north-sloping ones, are covered by relatively thick stands of mature balsam, cedar, fir, hemlock, and tamarack. Patches of dense willow and alder underbrush are common along creek draws or otherwise wet areas.

The regional climate tends to be moderate. However, the annual precipitation is relatively heavy. This generally occurs as snow between October and May, with the resulting snow pack ranging from generally five or six feet to occasionally nine or ten feet in depth during the more severe winters.

SERVICE & SUPPLY FACILITIES

Small hardware, fuel and lubricants, and some mechanical and electrical repair services are locally obtainable at New Denver or Silverton. Some major items of mine equipment, parts, industrial supplies, and special mechanical and electrical repair and rebuilding services may generally be obtained from, or at Nelson, Trail or Grand Forks --- all between

60 and 120 miles from New Denver and serviced by a number of regional trucking companies. Supplies, equipment and services that are not obtainable from the above noted centers can usually be obtained quite readily from Vancouver, B. C.

As compared with most B. C. producers, the Silmonac mine is quite advantageously situated with respect to markets for its concentrates, in that these are available, at quite economic trucking distances, at Trail, B. C. and Kellogg, Idaho.

MINE WORKINGS & GENERAL PLANT

Currently, the 4,625 adit crosscut and laterals comprise the main haulage/service level. The pre-1974 exploration and development of the original ore zones to the east and west of the main crosscut were carried out via the systems of laterals and crosscuts on the 4,625, 4,690, 4,755, 4,815, and 4,855 levels, and by raises connecting them. A system of raises and connecting (footwall) crosscuts between the 4,755 level and the Mascot adits is used as a 'safety exit' and for auxiliary ventilation purposes.

Until mid-1974 the bulk of the mine production derived from mineralized areas of the lode up dip of the 4,625 horizon. Most of these ore zones were discovered and partly delineated by diamond drilling from 'footwall laterals' driven approximately parallel to the local strike of the lode, but below the actual footwall (shear) of the lode structure. Development and stoping operations were carried out from slusher drifts at convenient stope-sill elevations. Crosscuts or access raises and ore passes (chute raises) to the slusher drifts were driven from the respective laterals. All working laterals were equipped with track. Ore and waste were transported by mine cars, hand trammed or hauled by electric locie, to gathering points on the main haulage level, or to ore and waste passes leading to it.

The above noted system of footwall laterals, with drill stations located at appropriate strike intervals, permitted systematic and efficient exploration of the lode above the 4,625 horizon. Similarly, the 4,625 and 4,690 hangingwall laterals, allowed similar exploration - drilling efficiency --- but only for limited dip-extensions of the lode below the 4,625 horizon. The hangingwall - laterals and crosscuts, however, and unlike their footwall counterparts, are not appropriately positioned for the subsequent development and mining of ore zones discovered from them; hence their net result is to markedly increase development expenditures or indirectly, increase gross mining costs.

Until mid-1976 ore was derived from stopes above and below the 4,625 level. Since then, all production has come from ore zones situating down-dip of the 4,625 horizon. These zones, which were originally indicated and partly delineated by down-hole drilling from the 4,625 and 4,690 levels, are being further explored, developed, and mined by L.H.D. (load-haul-dump) methods -- this by way of declines driven from the 4,625 (haulage) level. These operations and workings are described later in the report under the heading 'Current Mining Operations '.

The mine plant, situating on the 4,625 portal bench, comprises diesel powered compressors, electric power generating units, battery charging/ changing equipment, shop, dry, timbershed, ore bin, and waste trestle/ dump.

The principal items of underground equipment comprise ore cars, battery powered locies, wheel mounted mucking machines, and jack-leg and stoper rock drills. One Wagner ST2B and two Wagner ST2D (one on stand-by) diesel powered Scooptrams are being employed in the current areas of operations, which are all below the 4,625 level. These machines are serviced in a 'service bay' located in the 4,625 No. 2 crosscut.

A 24 H.P. electric mine fan, located in a crosscut from the main Mascot tunnel, provides auxiliary mine ventilation via the mine safety exit when natural ventilation is inadequate.

The flotation concentrator has the capacity required to handle 140-150 tons per day of typical mine ore. Power for it is supplied by a 312 KVA diesel electric set. It produces clean lead and zinc concentrates, and is metallurgically efficient. Average recoveries made during 1976 were for:

Ag, 96.5%; Pb, 96.0%; Zn/Cd, 91.0%

HISTORY

By 1947-48, and from the results of a continuing and comprehensive exploration program, Kelowna Exploration Co. geologists recognized the ore potential of the center, or "Hope-Carnation' interval of the Main Slocan lode. Consequently that Company, over a period of time, consolidated the various properties which now comprise the Silmonac claim group. In the spring of 1949 the Kelowna company commenced work on the Carnation 5480 tunnel, which was planned to test the Carnation interval of the Main lede at the horizon some 200'-300' under the axial plane of what had been interpreted as the main Queen Bess overturn (axial regional of a horizontally - recumbent bedding fold open to the west). However, the 1,900 foot long footwall lateral/drift along the apparent Main lode, plus test holes and crosscuts, failed to disclose any significant amounts of mineralization on the main target. These negative results, together with a shortage of funds and confidence, caused a scaling down, and finally, the termination of Kelowna's Slocan program in 1951. Later analyses of the results of the 5480 project showed that the exploratory tunnels driven actually situated some 300'-400' above the target, or axial region of the main Queen Bess fold. Also, in the writer's opinion, it has not yet been established as to whether or not the lode investigated had real ore potential, or if it's dip extension comprises the Silmonac mine lode.

The Silmonac Syndicate was formed in 1962 for the purpose of exploring the 'Silversmith-Hope' lode at an elevation of 4,000 feet, via an extension

of southerly workings on Ruth No. 5 level. Only some 'preparatory' work was carried out that year. In 1963 Silmonac Mines Limited was incorporated, and the 4,000 level drive westward was started. In 1966 Kam-Kotia and Burkam Mines Limited leased the property, took over its management and continued the main drive in the footwall of the lode to its present face at 7,500 feet from the Ruth No. 5 portal. Diamond drilling during 1967, from the west face of the 4,000 level, intersected mineralization to the south of, and some 600 feet vertically above the drive horizon. Due to the deviation of each of three holes completed, underground drilling was terminated in favour of down-drilling from stations on the East Fork of Tributary Creek. The total drilling results indicated the presence of a significant, flatly south-dipping body of apparent ore-grade mineralization containing better than average Ag/Pb ratios. On the basis of this discovery it was decided to investigate it, plus the general segment of the lode containing it, by crosscutting southward from a suitable point on the surface, close to the 4,600 foot elevation. This crosscut, collared at 4,625 elevation in the East Tributary Creek draw, intersected the lode at about 3,000 feet from the portal. Footwall laterals were driven eastward and westward and the lode tested, with positive results, by diamond drill holes from these headings. Development was continued, and ore production started in September, 1970. Production has been continuous since that date, although the rate has varied sharply from a low of about 600, to a high of nearly 4,000 tons per month, depending on the availability of ore reserves in any given period, the rate at which they could be developed, the total production capacity of the mine plant, and the availability of skilled labour.

CURRENT MINING OPERATIONS

Present exploration, development, and mining operations are all being conducted in mine areas below the 4625 main haulage level. These are now being carried out, as has been previously noted, via declines and L.H.D. equipment (2 cu. yd., or 3 ton, capacity Scooptrams).

The present system of declines starts from the 4625 No. 2 crosscut. Standard sized headings along main access routes, are 10' wide by 8' high. Branches, or stubs are driven at such flatter or steeper gradients as may be locally required for exploration, development or mining purposes. 'Mine services' are provided through the decline.

The usual procedure followed in mining a typical flatly-dipping ore bearing section of the Silmonac lode, from a section of decline which is sub-parallel to it, is as follows:

1. Drive a flat branch heading or 'stub' into and along the mineralized part of the lode for such distance as is required to establish an adequate stope-sill for subsequent mining purposes.
2. From the stope-sill, advance the stope up-dip and/or along strike, as required--normally extracting the ore via the open pillar stoping method, with the frequency and size of pillars being as required by local ground conditions and the comparative effectiveness of rock bolting for hanging wall support. Stope-rounds and slashes are drilled off with jack legs and/or stopers. Broken muck is slushed to the stope sill, where it is loaded and hauled by Scooptram up the decline and ramp to the 4625 level ore pocket.

The L.H.D. method does away with the necessity of excavating slusher drifts and,generally,the extra ore and waste chutes, and service raises,that comprise the usual auxiliary installations. In addition, the method is much more flexible, as regards its over-all applicability, than most'conventional' development/mining methods. The main disadvantage of the method lies in the limited capacity of the self loading and hauling

equipment, where this capacity is measured in ton-miles per hour. This is particularly limited where decline gradients are of such magnitude as to markedly decrease the travelling speed of the equipment. Experience at Silmonac indicates that the 'economic' range or radius of its Scooptrams, operating on a 15% gradient, is about 2,000 feet. The production capacity of this equipment increases as the haulage way gradient is decreased; i.e., the capacity of a Scooptram on a one-way haul of 2,000 feet on a horizontal grade, as compared to its capacity on a one-way haul of 2,000 feet on a 15% grade is approximately 2 1/4 times greater. The calculation for this follows:

A - On horizontal grade,

Haul 2,000' @ 607'/min (3rd gear)	3.3 min.	
Return 2,000' @ 994'/min (4th gear)	2.1 min.	
Load and dump	1.5 min.	6.9 min

B - On 15% decline,

Haul 2,000' @ 185'/min. (1st gear)	10.8 min	
Return 2,000' @ 607'/min. (2nd gear)	3.3 min	
Load and dump	1.5 min	15.6 min

The 'net' operating shift' = 6 1/2 x 50 min.; load = 2.75 tons/scoop.
Relative capacities A:B = 129:57 = 2.26:1

From the 4625 loading pockets, ore or waste are loaded into mine cars which are then hauled some 3,000 feet by battery-locie out of the track-equipped 4625 main crosscut to the portal ore bin or waste dump. The mine ore is transported, by truck, to the concentrator. The resulting lead concentrates are delivered by truck to the Trail smelter; the zinc concentrates are delivered, also by truck, to the Bunker Hill Smelter at Kellogg, Idaho.

The mine operates two shifts per day and five days per week. The mill operates three shifts per day over as many days per week or month as are required to handle the mine production, excluding 'down-time' for maintenance and repairs. The total number of staff plus hourly-rated personnel on all shifts in mine, mill and surface is about 46.

The development decline being advanced west of, and below the 4625 crosscut has reached the east edge of the ore zone ('West Ore Block'/ Dwg. S-2) lying below the 4625 level, and outlined by diamond drilling done in 1973 and later. Two holes drilled from the recently advanced interval of the decline, for the purpose of 'locating' it with respect to the section of the lode overlying,it have intersected good widths of ore-grade mineralization. East of the 4625 crosscut, the continued advance of the decline has taken it below the 4375 elevation. Exploration 'stubs' that have recently been driven off of it have intersected good mineralization comprising part of the diamond drill hole and decline - indicated 'East Ore Block'.

PRODUCTION RECORD

(a) SILMONAC MINE

From September 1970 to December 31, 1976 total ore production (mill-heads) amounted to:

136,039 short dry tons @ 16.43 oz/ton Ag, 5.8% Pb, 5.9% Zn + Cd

During 1976 the bulk of the production came from ore reserves below the 4625 or main working level by reason of the fact that most ore reserves above it had been depleted. Further, as funds available for development purposes were limited production, being dependent on development,was limited. In spite of these restrictions, the 1976 operations returned a modest operating profit, largely as a result of good planning and control by management. Mine production in 1976 amounted to:

18,402 short dry tons @ 13.35 oz/ton Ag, 5.30% Pb, 4.86% Zn, resulting in the following mill production:

Lead Concentrates

1556.25 s.d. tons @ 98.68 oz/ton Ag, 59.23% Pb, 9.14% Zn.

Zinc Concentrates

1367.10 s.d. tons @ 61.91 oz/ton Ag, 49.54% Zn, 0.37% Cd.

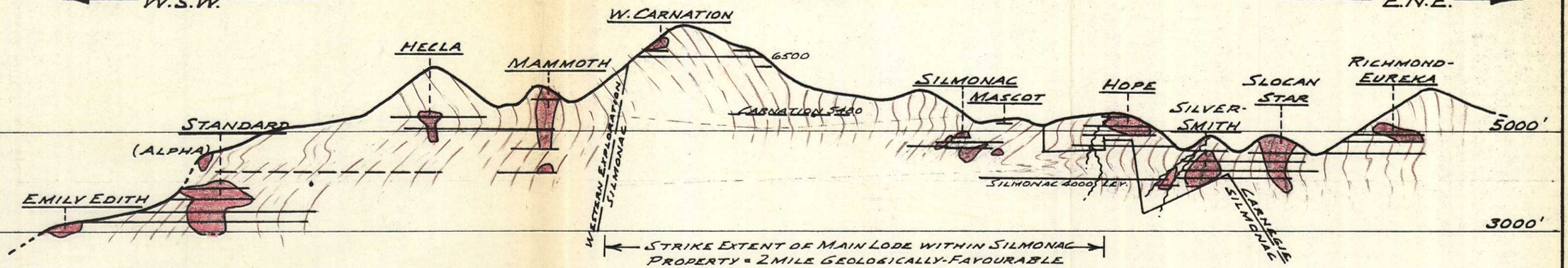
LONGITUDINAL VERTICAL PROJECTION ON THE MAIN SLOCAN LODE

SHOWING

FORMER OREBODIES & SILMONAC INTERVAL OF MAIN LODE

2000 0 2000

SCALE. FT.



MAIN LODE PRODUCTION THROUGH 1976.

MINE	TONS ORE PRODUCT.	AVERAGE ORE GRADE SILVER.OZ/T	LEAD.%	ZINC.%	RATIO AG,OZ PB.%	CURRENT GROSS VALUE PER TON	TOTAL
STANDARD GROUP	779,182	11.0	5.4	6.7	2.04	$132.81	$103.484.718
HECLA	5,600	35.0	9.0	5.0	3.89	254.68	1.426.208
MAMMOTH	83,349	12.0	4.0	5.2	3.0	117.58	9,800,508
HOPE (EXCL. RUTH EXT.)	26,000	29.0	11.0	2.0 EXT.	2.64	220.00	5.720,000
SILVERSMITH & EXT'N.	227,000	17.0	6.6	3.8	2.57	148.17	33.634.136
SLOCAN STAR	145,194	23.7	14.5	2.0	1.64	219.35	31.848,593
RICHMOND-EUREKA	42,535	19.1	6.2	2.2	3.08	143.98	6,124,359
WEST CARNATION	677	40.5	16.6	2.7	2.44	314.92	213,198
SILMONAC	136,039	16.4	5.8	5.9	2.83	154.59	21,029,996

METAL PRICES. FEB., 1977

AG. $CAN. 4.56 PER TROY OZ.

PB. " 0.336 PER LB.

ZN " 0.346 " "

TOTALS. MAIN LODE ONLY, 1.445.576 TONS @ LISTED METAL PRICES $213.281,716 : INCLUDES REPORTED ZN ONLY. EXCLUDES CD & AU VALUES.

REFERENCES "MAIN LODE, LONGITUDINAL PROJECTION" S.J.P., 1960
BULLETIN NO. 29, B.C. DEPT. OF MINES, 1952

LEGEND

FORMER OREBODIES.

DRIFTS & LATERALS ALONG LODE TREND. PRINCIPAL SECONDARY

BEDDING DIPS - PRINCIPALLY F.W. SECT.

FIG. 3

ESTIMATED PAST PRODUCTION FROM THE MAIN SLOCAN LODE

SILVERTON - SANDON AREA, B.C.

FEBRUARY, 1977 COMPILED BY W.M.S.

(b) MAIN LODE TO DATE

The total of the reported production from ore bodies along the Main lode amounts to:

1,445,576 tons @ 14.5 oz/ton Ag, 6.6% Pb, 5.4% Zn.

The above figure pertains only to the reported production. It does not include some unreported production that was made during the initial period of mining activity in the Slocan mining camp, nor does it include the considerable tonnages of zinc-rich material that were sent to the waste dump, left in place, or discarded as stope back-fill, due to the fact that it could not be profitably marketed during some previous periods.

Shipments from over 200 separate properties in the Slocan mining camp total about 1.94 million tons. On the basis of this, it is estimated that the ten ore bodies along the Main lode, including four relatively minor ones, accounted for 74% of the total ore production of the camp.

The mined, partly-developed, and relatively unexplored areas within the six mile strike length of the Main lode are fairly well portrayed by Dwgs. S-1 and S1-A. In the writer's opinion, the relative extent of these areas is such as to indcate that less than 50% of the potentially productive area of the lode has been tested by the work accomplished on it to date. Of more direct importance to the Company is the fact that at least half of the relatively unexplored part of the potentially productive section of the Main lode lies within the Silmonac property boundaries.

GEOLOGY & MINERALIZATION

A. REGIONAL

The Sandon mining area is situated within a block of highly folded Triassic sedimentary rocks lying over the Kaslo greenstone on the northeast, and

between Kuskanax and Nelson Batholiths, respectively, on the north and south. Structurally, the Slocan Series lies within the 'Kootney Arc', an arcuate belt of highly deformed marine sedimentary, volcanic, and metamorphic rocks. The west margin and central section of this belt are defined by the north half of Kootenay Lake; its northwesterly extension passes through Revelstoke, while its southwesterly extension crosses the International Boundary south of Trail, B. C.

The bulk of the rocks comprising the Slocan series are of sedimentary origin--mainly argillite, quartzite, and limestone. Within the central part of the Slocan mining camp the sediments have been buckled and warped into the form of a complex recumbent fold of regional scale. The argillaceous-quartzitic-limy formations caught up in this fold, and the sheets and masses of granitic rock invading it comprise the host rocks for the Ag-Pb-Zn mineralization of the region. It is estimated that the stratigraphic (dip-normal) thickness of Slocan sediments involved in the regional fold is upward of 30,000 feet.

Conditions of original deposition were such that rock compositions can change noticeably within a few hundred feet along the strike or dip of a bed. This, or because of local changes due to secondary alteration, anticipated projections of specific rock types does not always take place.

Within the Sandon area, that part of the Slocan fold that has escaped erosion is exposed over a vertical range of up to 5,000 feet. The 'roots' of the fold are deep below Carpenter Creek valley and, probably, merge into a basement of Nelson granite. Three components of the composite fold that are recognizable in the Sandon-Silverton area are, going upward through the structure, the "Payne','Queen Bess' and Silver Ridge folds or 'overturns'. Bedding strikes are generally to the northwest. Within each of the above noted sub-folds, except where anomalous situations exist, beds dipping to the southwest are 'right-side-up', and those dipping to the northeast are 'overturned'.

Within the general structural section two main classes of faults have been recognized. These are classified as 'tangential' and 'cross cutting', respectively. The tangential (or 'formational') faults are essentially bedding faults, and tend to strike and dip with bedding sections in which they occur. They are seldom mineralized; however where they intersect mineralized cross cutting faults, and are conjugately related to them, they may be significantly mineralized. The Silmonac lode shows an apparent vertical displacement of 60 feet where 'cut' by a tangential fault. The cross cutting faults generally strike northeasterly, but locally may deflect significantly from this general trend; dips range from flatly to steeply southeastward, but perhaps would average 45-50 degrees. They are usually mineralized to some extent. The lodes of the district are cross cutting faults that contain mineralization of some economic importance and extent.

The predominant lode displacement is one in which the lode hangingwall has moved eastward and slightly downward relative to its footwall. The actual displacement is considered to range between a few tens of feet on minor lodes, and between a few and several hundred feet on major structures like the Main lode.

The study of many former mines within the Slocan Series of rocks has indicated, in a general way, that:

(a) In lodes of subordinate strength or importance that traverse an important zone of bedding dip reversal, ore bodies tend to occur within the axial region of the fold.

(b) Ore bodies on major lodes, like the Main lode, can occur anywhere through the west dipping ('optimum') panel. At least locally, they may occur within east dipping sections of bedding, as discrete ore bodies or as the upward or downward extensions of ore bodies centering within the optimum panel. Ore is found within all kinds and mixtures of rock and at all elevations; however, studies of many lithological structural situations indicate that it is least likely to occur where both walls of the lode consist of strong massive quartzite, or where the bedding in both walls of the lode dips at about the same

angle as that on which the relative, or net lode displacement occurred.

B. MAIN LODE

This major crosscutting zone of fracturing, shearing and folding has a known strike length of six miles. It is a zone, or partly connected system of tear faulting and is the most important lode of the district. In composite width, it ranges from only a few feet to more than 100 feet. Also, it contained, and probably still contains the largest ore bodies to be found in the Slocan mining area. It has been most extensively explored and mined at its west and east ends where, by reason of the local topography, its more productive depth ranges were relatively more accessible during the early 'discovery' years of the camp.

Reported production from the two mile long Standard-Mammoth interval of the structure was close to 870,000 tons of good grade milling ore; that from the east, or Hope-Silversmith-Richmond Eureka end, amounted 440,000 tons of relatively high grade milling ore. To date, production from an only partly explored and developed 2,000 foot strike length towards the east end of the Silmonac property totals over 140,000 tons of millfeed grading better than 16 oz/ton in silver and about 12% combined lead and zinc, or slightly better than the average grade of the total production from the Main lode. To the east and west, respectively, of the 2,000 foot section are some 1,000 and 7,000 feet strike lengths of essentially unexplored Main lode within Silmonac ground.

C. SILMONAC PROPERTY & MINE

Drawings S-1, S1-A, S-2, and S2-A supplement the following text.

Surface exposures of the Silmonac lode are rare, and appear to be restricted to certain trenches on Jennie Ridge and, less obviously, to trenches and shallow dozer cuts between the Mascot workings and East Tributary Creek. However, the mapped position and attitude of these few exposures are such as to indicate that the Silmonac lode is within the zone of cross faulting which comprises the Main lode and, more specifically

within the Carnation-Hope interval of it.

Discontinuous exposures of bedrock indicate that the Silmonac lode cuts across a variety of rock types. These consist of argillites, quartzites, limestone, limy and non-limy gradations of these, and granitic porphyry. Locally, any rock type may be altered to the extent where it is difficult or impossible to identify its original composition. Limestones and limy argillites and quartzites appear to be most susceptible to alteration, with the alteration generally being most intense in the vicinity of the lode, and particularly where its wall rocks have been significantly intruded by porphyry. Silicification (cherty varieties), followed by silication (hornfelsic varieties) are the commonest types of alteration affecting the sediments. Silicification of the porphyries is also frequent, producing 'spotted cherts'; however, silication, mainly evidenced by more or less disseminated brown biotite, is also common. Most of the common types of alteration are pre-ore in age; hence, they do not serve as indicators' of possible ore bodies. If any, alteration, particularly where it has been superimposed on compositionally gradational assemblages of rock types, only adds to the difficulties of geological mapping, correlation, and interpretation. Unforseeable, but often pronounced changes in rock type and structure within relatively short distances are common, particularly in situations involving a strong lode, intensely deformed wall rocks, and much porphyry intrusion, such as exists at Silmonac. Hence, it appears that the soundest exploration program is one that is based on the general geologic favourability of an area or zone, plus an appraisal of its ore making possibilities or potential, based on results obtained in a contiguous area, or on the general measure of success had in a geologically similar or related zone. Or, stated more briefly, it appears that a sound exploration decision is one that is based on both the geological and statistical probabilities for the occurrence of ore.

Within the mine, the 'footwall' section of rocks has been more extensively exposed, and/or mapped, than the hanging wall section. Hence, interpretations made in the following text are largely, although not exclusively based on the footwall geology.

Longitudinal vertical projections S1-A and S2-A portray ore bodies and footwall geological detail within various parts of the Silmonac on one composite vertical plane oriented in a S.W.-N.E. direction. Taken together, the above sections show that the higher bedding sections dip generally northeastward to elevations between 5,000 - 5,500 feet. Within this elevation range, dips steepen and roll, simply or via zones of complex folding, through vertical to southwesterly (right-side-up) dips. Below the above noted zone of dip reversal bedding dips are predominantly to the southwest; hence they comprise a general west dip panel of bedding.

The 'west dip panel' as it relates to the Main lode, and by reason of its relative accessibility and geological and statistical favourability, has been the source of more ore production, or site of more successful exploration and development work than any other structural zone within the central Slocan mining area. It's vertical range at various places along the Main lode varies by as much as several hundred feet, but is rather generally limited, at least within relatively competent sections of bedding, by the 3,900' and 5,200' elevations. All of the Silmonac mine workings locate within this vertical range, but only very locally have they been advanced even as far downward as the 4,300 elevation and this only on dip extensions of the main East ore zone.

As the lode appears to have formed within, and as a result of a regional scale transverse (S.W.-N.E.) zone of bedding deformation, across which (hinge line) there appears to be pronounced differences in bedding attitudes or general structural pattern, a matching of footwall and hanging wall geology is not to be expected, even after making allowances for relative (lode) footwall/hanging wall displacements.

The 'Silmonac' interval of the Main lode has been revealed as a broad, composite shear zone cutting, and locally following a complexly folded assemblage of thickly to thinly bedded 'quartzites' and sill-like and dyke-like sheets and lenses of porphyry. The lode appears to range between 10-40 feet in width. It is a zone of multiple braided and -linked shears between which masses of wall rock are fractured or brecciated. The lode

filling is veined or cemented by quartz, siderite, and calcite; it is mineralized with galena, sphalerite, minor sulpho-salts, and 'ruby silver', plus associated pyrite and pyrrhotite. The ore mineralization occurs within two fairly distinct, pinching and swelling layers referred to as the 'footwall vein' and 'hanging wall vein'. Normally, they are separated by some 10-20 feet of 'waste rock', but locally merge or are sufficiently close so that they may be mined together. In places the mineralized zone comprises an aggregate of separate ore lenses that can be mined in bulk. Mined widths range from about five feet to ten feet, and locally up to 20 feet. The bulk of the mine production derives from the 'footwall' vein.

For the most part, the strike and dip trends of the vein result from interpretations and correlation of data provided by drill hole intersections. On Dwg. S-2 these are shown as structural contours, and relate to the footwall 'vein'. These portray the vein as a generally flatly dipping and sinuously striking structure which over its presently defined extent, has an average N.E. strike; dips generally range between 10-30° S. The sinuous trend of the Silmonac lode, which is more pronounced along its strike than along its dip, is the result of successive deflections in strike as it traverses formational assemblages of differing competency and attitude or structural form. The more pronounced bends often occur where the lode is deflected at tangential faults, and where it'rolls' around footwall or hanging wall 'buttresses' of porphyry. The sinuous trend comprises a structurally favourable feature; hence, the presence of porphyry is also a favourable feature.

In comparison to the main Standard and Silvermsith, Slocan Star ore bodies, the individual Silmonac ore bodies appear small; however, their aggregate area is such that they total 25% or more, of the explored and developed area of the Silmonac lode, a situation which yields 'multiple opportunity' targets, rather than only a few 'single opportunity' targets which could be missed (or bracketed) by an exploration plan which might be based on widely spaced 'fans' or 'cones' of drill holes.

X-Secs W-1, W-2, and E-1 supplement the plan (S-1) and longitudinal vertical section (S-2). The particular location of each has been selected to portray what is, in the writer's judgment, the cross sectional configuration of typical strike segments. Overlay W-2/W-1 shows the deflection and normal displacement of the lode on strong bedding fault zones cutting 4625 and 4690 levels. X-Sec. E-1, which is through the area of the deepest development accomplished to date, indicates that the lode is productive over a 1,200 foot dip range. In the writer's opinion, it is highly probable that the 600 foot dip interval extending to the 4,000 level will be equally productive. The fact that some small lenses of high grade mineralization have already been found on the 4,000 level within a relatively 'weak' section of the lode at more than 1,200 feet east of the lowest ore currently being developed, enhances the probability of the above noted extension.

ORE CONTROLS

Silver-lead-zinc mineralization has been wide spread, and it is probable that at least minor volumes of the mineralizing solutions had access to virtually all cross cutting faults, including the smallest. Most ore bodies occupy restricted positions in veins or lodes and, consequently, only a very minor part of the gross area of the host structure. Therefore, if the search for ore is to be conducted efficiently, and particularly where no surface exposures of it are present, as is the case over much of the Silmonac ground -- recognition must be given to the various 'controls' that might have influenced its deposition. The following text deals only with the types of controls that relate to the formation of mineral and ore deposits within the main Slocan mining area. Whether or not a mineral deposit actually comprises an ore body is determined by the co-occurrence of several factors such as metallurgy, grade, size and mineability, metal prices, and the over all economic viability of a possible mining operation. In the Slocan camp, the various controls all involve some favourable combination of rock type and lode and bedding structure. Formerly held theories that one particular rock type or

structural situation was the most favourable have not proved to be factual. The major ore controls, per Bulletin 29, Circ. 1952, and other sources are as follows:

(1) Rock assemblages of the right degree of brittleness and competency cut by the lode or vein. Massive-competent wall rocks tend to fracture via a single tight fissure. Soft rocks tend to be sheared, and thus create a filling of (impermeable) gouge. The optimum competency of any assemblage of wall rocks depends largely on the amount of movement (and development of gouge) that has taken place on the vein or lode.

(2) A situation where a vein or lode crosses bedding at a large angle, and particularly where the direction of movement of the lode is rather squarely-across the bedding. This is the control upon which the assumption of the favourability of west-dipping assemblages of beds, traversed by a lode featuring a relatively downward and eastward movement of its hanging wall, is based.

(3) The presence of cross faulting and fracturing (a cross fracture is defined as any fracture along a plane at an angle to that of the lode) is favourable. This includes tension faults, branch faults, and link faults and fractures.

(4) Lode or vein segments where marked changes in strike (and locally, dip) occur: These include single or paired bends as at, or through a formational fault; rolls, such as occur by reason of the footwall or hanging wall occurrence of bodies of massive quartzite and/or porphyry; and generally sinuously striking veins or lodes -- all present within the Silmonac lode segment.

(5) Where a bedded lode warps to cut across the bedding. At Silmonac this situation probably occurs frequently, but tends to escape notice.

The low dip angle, sinuous strike, and highly sheared character of the Silmonac, or at least of sizeable areas of it, tend to distinguish it from the general type of lode (or vein) to which most of the aforenoted controls are readily applicable. The general lithology and structure of the Silmonac footwall formations, together with the cross cutting relationship of the lode with respect to them, comprise principal features that are characteristic of many of the productive lodes and veins within the central Slocan mining area. However, what appears to be a unique feature of the Silmonac geology, as deduced from inspection of the few relevant sections exposed by the mine workings, is that over apparently large areas of the lode there is a rough parallelism between lode fractures, bedding within the lode, and hanging wall formation, the latter sometimes including considerable porphyry. The 'bedding sections' involved have various degrees of competency. This particular association and configuration of lode/bedding structure has been termed a 'lode panel' or more generally, a 'transverse panel'. The evidence at Silmonac, as well as that gathered as a result of detailed mapping in the Mammoth mine and over the Carnation surface, and from reports of investigations of the Standard mine, is such as to indicate that transverse panels represent a late, or modifying stage of the deformation that produced the Slocan fold. The final stage of folding is believed to have climaxed via the first stages of the cross faulting that culminated in the development of the Main lode. The significance of a transverse panel, as compared to a drag panel -- the result of lode displacements -- is in the fact that it has exerted a structural control in the development of major and minor lode structures and, also, porphyry intrusion, alteration, etc. In relatively competent assemblages of rocks (some of these possessing competence by reason of the inclusion of porphyry and/or 'hard altered' rocks within the assemblage) arching, crumpling, and fracturing produce 'open space'situations. More important, the passage of ore forming solutions (?) through a section of the lode in which there is a sufficient concentration of such minor ore structures would result in a generally mineable or composite ore body. In the writer's opinion, a large part of the Silmonac lode generally fits into this pattern, and consequently suggests that anothor variety of 'ore control' may be added to those already listed.

ORE RESERVES

DEFINITIONS

Tonnage factor, as used at mine --- 10 cu. ft. per short dry ton.
Areas of lode and ore bodies in following estimates are either slope areas or their projections on plan or long vertical projection, as either of latter two are proportional to, or representative of their slope areas. Minimum mining width (m m width) assumed to be 5 feet.

The following definitions pertaining to the classification of ore reserves are as given in the section National Policy No. 2, British Columbia Securities Commission Weekly Summary dated September 20, 1974, plus qualifications apropos of the Silmonac mine.

'Ore': A natural aggregate of one or more minerals which, at a specified time and place, may be mined and the contained minerals separated at a profit.

'Positive' Ore: Size, shape and mineral character rather definitely established by several rather closely and uniformly spaced hand, or drill hole samples--partly applicable to Silmonac ore blocks.

'Probable' Ore: Material for which tonnage and grade ore computed partly from specific measurements, samples or production data, and partly from projection for a reasonable distance on geological evidence, and for which the sites available for inspection, measurement, and sampling are too widely or otherwise inappropriately spaced to outline the material completely, or to establish its grade throughout. Silmonac W. Block may be classified as 'rather firmly indicated'.

'Possible' Ore: Material for which quantitative estimates are based largely on broad knowledge of the geological character of the deposit and for which there are few, if any, samples or measurements, and for which the estimates are based on an assumed continuity or repetition for which there are reasonable geological indications, which indications may include comparison with deposits of similar type; bodies that are completely concealed may be included if there is specific evidence of their presence.

(a) PROBABLE OR INDICATED ORE RESERVES

This is contained within three separate ore blocks in which the respective tonnages areestimated on the basis of a larger than average number of drill hole intersections, conservatively drawn block perimeters, calculated average thickness and weighted average drill hole grades. Calculations of weighted-average-drill hole grades for each block show them to be generally equivalent to the average grade of the Silmonac ore production to date; hence, as they are essentially direct extensions of previously mined ore blocks, this grade has been assigned to them.

The three separate ore blocks comprising the present probable ore reserves are shown in plan and long vertical projection, respectively, on Dwgs. S-2 and S2-A. The West Block, the largest of the three, comprises the faulted southwesterly continuation of the main west (rel. to 4625 X-C) ore body which has accounted for at least one quarter of the mine production to date. In addition, the West Block situates on the axis of a tight lode flexure (also per X-Sec. W-2) that traverses what appears to be as physically favourable (mixed competency) a section of wall rocks as that which contained the main west ore body. In addition to above noted factors of favourable geology and position, the tonnage/grade figures for the West Block are based on 14 drill intersections of both high and low ore grade material. Hence, the West Block could be alternatively classified as a 'firmly-indicated' ore block, on the general basis of past drilling experience.

The East Block mineralization, originally disclosed by exploratory drill holes from the 4625 H.W. Lateral, is locally exposed in the walls of the advancing East decline, and in stubs and raises driven off of it. Its area and average thickness and grade are determined from intersections from six widely spaced drill holes, plus direct exposures. The central one constituting a 5' - 6' width of good grade material on which slash-stoping has been carried out as far down-dip as is currently feasible from the 9-E stub. The zone is on the E.-S.E. plunging axis of the current main east ore body, and within a wide segment of lode comprising a zone of strong shearing and crumpling. Currently, and on the basis of the limited number of 'intersections', the west-east dimension of the

block is quite closely delimited; on the same basis, however, it could be shown as 'open' in this direction. The writer speculates a considerably larger pitch extent for it than is currently 'allowable'.

The small 'N.E. Block' is,on the drawings, conservatively represented as the direct dip-extension of the relatively small (?) northeast ore body. The controlling structure would appear to comprise a Z-flexure on the lode, hence, its geological situation is favourable for an eventual enlargement of the block as currently delimited.

The grade of the probable (or indicated) ore reserves is assumed to be that of the total mine production to date or, 16.43 oz/ton Ag, 5.8% Pb, 5.9% Zn (+Cd). Estimates for each of the blocks, which together comprise the 'probable' ore reserves, follow:

West Block:
Calc. (a), 3.0' true width @ 30.6 oz/ton Ag, 8.9% Pb, 8.1% Zn.
" (b), @ 5.0 m-m " @ 18.4 " " , 5.3% Pb, 4.9% Zn.
allowing for core-loss and geological association with main West ore body,
Estimate @ 26,933 dry tons @ average grade of mine production to date.

East Block:
Calc. (a), 3.0' true width @ 29.07 oz/ton Ag, 13.7% Pb, 8.1% Zn.
" (b), @ 5.0' m-m " @ 17.4 " " , 8.24% " , 4.9% Zn.
On the basis of equivalence in value to average grade of mine production,
Estimate @ 19,222 dry tons @ average grade of mine production to date.

N.E. Block:
Basing grade entirely on that of mine production to date:
Estimated @ 2,700 dry tons @ average grade of mine production to date.

TOTAL, @ average grade of mine production to date.
= 48,855 dry tons @ 16.43 oz/ton Ag, 5.8% Pb, 5.9% Zn (+Cd).

(b) POSSIBLE OR POTENTIAL ORE RESERVES

The preponderantly west-dipping assemblage of Slocan rocks between the axial elevations of the more-or-less horizontally recumbent Queen Bess and Payne folds has been termed the "optimum panel", by reason of the fact that it contained the main mass of most of the ore bodies of the district including the most productive of them. Although the upper and lower limits of this panel vary from place to place, they generally lie at about the 5,200' and 3,900' elevations, respectively. It is probable that some dominant ore control, or a combination of them, localizing ore to this particular vertical range of the Main lode is the reason why it has proved to be the most productive. However, this is not of decisive importance, and there could be other reasons, such as:

(1) Higher, equally or better mineralized parts of the lode could have been removed by erosion.

(2) Good conditions for the basic prospecting methods and 'grass roots' type of exploration/development ventures that took place during earlier years could have existed here.

(3) Because of the presence of a favourable topography, access to what later proved to be the more productive parts of the lode was relatively easy; hence, the more significant exploration and development operations tended to be concentrated here with the result that a proportionately larger quantity of ore was discovered here than in some more difficulty accessible parts of the lode.

(4) The panel comprised the optimum zone of ore deposition as determined by conditions (gradients) of temperature and pressure. As this would require the existence of a near horizontal solution source (Nelson granite?) at a nearly constant depth below this vertical interval of the lode, it constitutes the least likely of this list of possibilities.

The important fact is that, whatever the reason, the average 3,900' - 5,200' vertical interval of the Main lode has, thus far, proved to be the most productive interval over the greater part of its presently explored and developed length.

Past exploration/development results have provided the basic data for statistically-based estimates of the frequency at which significant ore bodies occur over the strike extent of the lode particularly within specific dip intervals of it. Hence, the present estimates of 'possible' tonnage and grade or, alternatively, the 'ore potential' within the unexplored strike length and currently defined optimum dip-range are based on the contained statistical possibilities.

Three separate calculations, each involving different applications of the data, were made in order to arrive at a figure that would be most nearly indicative of the actual ore potential of the Silmonac segment of the Main lode. This figure is selected on the basis of the two closest figures resulting from the three calculations, analogous to the 'umpire assay' method of selection. The writer points out, however, that although this determination of ore reserves is based on accurate measurements of distances and areas (flex-scale and polar planimeter) and the application of safely conservative frequency factors the tonnage figures arrived at are essentially speculative in character.

Estimate A

Unexplored area of Silmonac lode segment = 1049 planimeter units.
Explored and developed area Silmonac lode segment = 137 planimeter units.
Silmonac ore production to December 31, 1976 = 136,039 tons

Therefore $\frac{136,039}{137} = \frac{X}{1049}$ = 1,042,000 tons.

Apparent 'frequency factor', $\frac{\text{structurally - favourable lode}}{\text{total area unexplored lode}}$ = 1/2

Possible ore reserve = 1/2 x 1,042,000 = 521,000 tons.

Estimate B

Total production, Main lode	1,445,576 tons
Indicated ore, Silmonac lode segment	48,855 "
Total, Main lode	1,494,431 "
Total 'optimum' area of Main lode	3921 planim units
Unexplored area Silmonac lode seg.	1049 " "

Therefore, $\frac{X}{1049} = \frac{1,494,431}{3921}$

Thus, Possible ore reserve = 400,000 tons

Estimate C

Total ore produced and indicated, Main lode 1,494,431 tons

Strike length (a) Standard-Mammoth lode seg = 12,400'

(b) Silmonac seg. = 10,500'

(c) Hope - Richmond-Eurecka seg = 8,100

Total 31,000' (= 5.87 mi.)

Ore produced and indicated per 1,000' of Main lode = 48,200 tons

Therefore, for Silmonac lode segment,

Possible ore reserve = 10.5 x 48,200 = 506,000 tons

On the basis of Estimates A and C, the Possible ore reserve within the unexplored part of the Silmonac lode segment, at the average grade of the total Silmonac production, is estimated to be at least

500,000 tons @ 16.43 oz/ton Ag, 5.8% Pb, 5.9% Zn (+Cd)

EXPLORATION-DEVELOPMENT CONSIDERATIONS

PRELIMINARY

Descriptions of exploration, development, and mining methods employed at Silmonac both prior to, and after the 1973/74 introduction of the decline/L.H.D.-based methods are described in the previous report sections 'Mine Workings & General Plant' and 'Current Mining Operations".

The writer's reference data shows that in the four-month period, June-September, 1976, the mine operations returned a net cash flow of $149,281. The total tonnage treated was 7,768 tons, for an average of 1,943 tons per month. In addition to this net cash flow, the operation provided a royalty of $23,304 to Kam-Kotia and mill rental of $9,000 to Carnegie. All of the above production came from a lode area, between elevations 4,450 and 4,550, developed by a branch - decline driven from the main East decline, the latter connecting with the 4,625 main working level.

The rate of production has been, and will continue to be limited by: 1) The rate of advance of the decline, 2) The availability of miners, 3) capacity of the Scooptrams, and 4) the ability to provide ventilation. Every foot of decline advance reduces the capacity of the Scooptrams, and the additional tonnage that can be developed by this decline is limited by Scooptram capacity and not by the mine's ore potential. This is illustrated by the following table showing a 2 cu. yd. Scooptram's relative production capacities when operating on a horizontal vs. a 15% (decline) grade:

1-Way Haul Dist. (Radius)	Capacity per 2-Shift Day, Horiz. Grade	Capacity per 2-Shift Day, 15% Grade	Ratio
500'	634 tons	355 tons	1.8:1
1,000'	430 "	210 "	2.0:1
2,000'	262 "	115 "	2.28:1
3,000'	188 "	80 "	2.35:1

Just how the rate of production under the present decline development system can be limited by just one factor, Scooptram capacity, is illustrated by the following example which, coincidentally, is relevant to current mining operations. Two Scooptrams provide service on two separate 15% declines, which have each advanced to the point where ore and waste must be hauled 2,000' up-grade:

Combined Scooptram capacity, ore and waste	= 230 tons per 2-shift day
Minimum capacity required for handling waste from 2 decline rounds, or equiv.	= 104 " " " "
Maximum capacity available for hauling ore	= 126 tons per 2-shift day

From this, it is evident that the Scooptrams have just surpassed the limit of their capacity, (a) relative to, say, a nominal 130 ton/day (2800 tons/month) mine operation, and have exceeded it relative to any higher production rate which may have been established.

With reference to the current production rate at the Silmonac mine, Scooptram capacity becomes a critical factor at a decline haul - distance of about 2,000 feet; in terms of vertical range it has, or will become critical at an elevation of about 4,400 feet on both the East and West declines. Below this elevation, progressively-decreasing Scooptram capacity will eventually make even the present scale of development/mining operations impossible. Consequently, the institution of some alternative to the present development/mining plan or system has become mandatory.

For much of the current year, the known and probable main sources of ore in the mine area east of and below the 4,625 main crosscut situate between the 4,450 and 4,300 elevations -- approximately delineated at present (Dwgs. S-2 and S2-A) as the 'East Block'. As shown in the preceding text, this ore zone is so located as to be at, and soon beyond the capacity of the present Scooptram - decline development/mining system.

During the present year, supplementary ore production is expected to come from what is currently delineated as the 'West Block' (Dwgs. S-2 and S2-A). The several strong drill hole intersections obtained from the plus 600 feet strike-length of the lode containing them indicate that this block might easily comprise the most important and accessible source of near - future production. The presently delineated part of it, comprising a flatly south-dipping ore zone, extends from the 4,600 to about the 4,500 level. On the basis of the 1973 and recent drill intersections, the writer sees an excellent possibility for important southerly and easterly dip extensions of the lower and well mineralized parts of it. Exploration and development of this block will probably require an extension of the main West decline to the 4,400 elevation. With this, the total decline haul distance would

exceed 2,300 feet, or to a range or depth which is beyond the capacity of the present Scooptram - decline development system.

On the basis of the exploration/development results obtained to date in the Silmonac mine the greatest lateral (2,000') 'spreads' of mineralization would appear to lie below the 4,625 level; hence, for maximum effectiveness, it appears that future exploration and development of the lode between the presently developed area and the Mammoth boundary should be concentrated between the 4,000' - 4,600' horizons. Also, as is indicated by the long vertical geological section, it would be most advantageously concentrated within the lower half of the 'main west - dip panel'. The fact that the two largest known ore zones on the Main lode, the 'Standard' and 'Silversmith', situate within the lower half of it (noting that the elevation - related 'bench marks are of limited relevance here') is in itself good reason for basing future operations at the lowest practical horizon possible. However, within this general context, it is pointed out that the better exploration opportunities will tend to be restricted to lode areas that are, lithologically and structurally, relatively more favourable. It is also noted that none of the recognized parameters or 'controls' is so absolute that it can rule out the possibility that significant bodies of ore may well occur above or below the currently perceived 'limiting' elevations.

Exploration above the Silmonac 4,625 level resulted in the discovery of ore over a strike length of some 1,100 feet, with some of this later mined to an elevation of 4,880 feet, some 70' below the local axial position of the 'Queen Bess' fold. However, thus far exploration to the east and west of this interval, above the 4,625 level, has been unsuccessful.

Past exploration of the Silmonac has often been costly and the results frequently inconclusive. In part, this has been the result of having to drill many long holes from what are often geologically and/or physically inappropriately located underground workings. It also seems quite possible to design future exploration/development layouts that will increase the general efficiency and reduce the cost of the operations dependant upon

upon them. Despite this, the exploration and development of the lode over an 8,000 foot, or more, strike interval and a (selected) 1,000 - 1,500 foot dip interval constitutes a major undertaking, and it is almost certain that this will have to be done from underground openings and via a staged program. The major considerations entering into this planning will be:

1) The location and attitude of the lode, or lodes over specific strike-intervals.

2) The design of the principal underground workings that will allow the selection of appropriate bases, such as drifts or laterals, plus 'auxiliary' crosscuts that together will permit efficient, systematic testing of large areas of the lode.

3) Design provisions that will permit the detailed drilling of mineralized areas discovered, to provide the data required for the assessments of tonnages, grades, and the economics of development.

4) Development and production parameters and factors.

5) Design of layouts that will allow maximum degrees of flexibility in exploration and development procedures.

In considering the alternative methods by which the current and possible longer range problems of exploration and development might be solved, several economic aspects of the general problem have to be considered. These, which are supplementary to the foregoing list include the following:

6) In respect of current probable ore reserves, the development/ production capacities of the present system employed at the mine are very limited, and well below mill capacity. This, due to high fixed costs, substantially reduces the profit which could accrue from mining these reserves at a higher rate. To illustrate, assume a net mine value of $75.00 per ton of ore reserve, and a production of 2,000 tons per month. From this, the net mine value of the monthly production is $150,000. With total operating costs of $115,000, the monthly profit is $35,000. If the rate can be increased to 3,000 t.p.m., the net mine value would be $225,000. As production costs would only increase

by about $20,000, for a month total of $135,000, the resulting operating profit would be $90,000, or $30.00 per ton as compared to $17.50 per ton.

7) Capital costs involved regarding the possible alternatives.

8) 'Flexibility' of the development alternative being considered.

9) Operating costs relative to the possible alternatives.

The most obvious of possibly several exploration/development alternatives are considered in the following text.

ALTERNATIVE METHODS

A - Continue Exploration Via Laterals on 4,625 Level

Exploration of the westerly extension of the lode above 4,625 level would, as with the existing 4,690 West F.W. Lateral, be done by attempting to guide the advance of such a f.w. lateral by vertical 'fans' of diamond drill holes oriented, as closely as possible, at 90° to the (local) lode strike. The principal difficulty here lies in attempting to deduce a possible change in the strike and/or dip of the lode which might be indicated by the drilling results. As a result of this it is almost impossible to maintain the advance of the lateral in a consistently appropriate position with respect to the lode. However, if a satisfactory lateral-to-lode spacing can be maintained, the method is appropriate in that the lateral can then be used for the follow-up development, mining and ore/waste haulage operations.

Exploration of the lode below the 4,625 level would require the driving of a hanging wall lateral parallel to the westerly extension of the lode. Exploration of the lode and the positioning of the heading would, as for a footwall lateral, be by vertical fans of drill holes. The exploratory effectiveness of this method is restricted, like the footwall lateral

method, by difficulties attendant upon the exploration of a variably striking and dipping lode and the proper positioning of the lateral itself by means of diamond drill holes. Its major disadvantage lies in the fact that the position of the resulting heading, with respect to the lode, is not appropriate for the subsequent production operations which could result from the discovery of ore. In any case, as there are strong indications that the main ore potential resides in the 3,900' - 4,600' vertical range of the assumed flatly-dipping lode, exploration based on the 4,625 level does not appear to comprise one of the more viable alternatives. It is estimated that the driving of 3,000 feet of either a f.w. or h.w. lateral, plus such effective drilling as could be done from it, would take at least a year to complete, cost approximately $400,000 and, even if successful, require major expenditures on follow-up development work.

B - Exploration Via Surface - Based Drilling

Any such attempt to explore areas of the lode extending below its 4,600 foot horizon would, by reason of the combination of a south dipping lode and a southward rising surface topography, (Dwg. S-1), require drill holes of 2,000 feet to 3,000 feet in length. Aside from the fact that five such holes would cost at least $200,000-$300,000, it would be almost impossible to make the required intersections with holes of this length, due to the almost certain hole deviations and deflections and general drilling difficulties that would be encountered. Therefore, this is neither a practical nor feasible alternative.

c - Access Via Adit X-Cut @ El. of Silmonac 4,000 Level

The new adit would be required to provide access for exploration, development, and production operations, and also serve as a ventilation conduit. Two distinct layouts, either of which would satisfy the above requirements, are feasible (Dwg. S-1):

(a) A crosscut collared on East Fork, Tributary Creek and drive S30° W. for 1,240', then south for 4,000', ending at point situating under, and some 800' south of the face of 4,625 crosscut, for a total length of about 5,240'.

(b) A crosscut collared some 500' east of East Fork, Tributary Creek, and driven due south for about 4,250', then west-southwestward, as a footwall lateral '@4,040-50 elevation, for approximately 1,750' to the same end point as (a) -- total distance about 6,000'.

This alternative, although 760' longer than (a), would provide shorter and easier surface access from and to the mill, probably a superior portal site, and the exploration advantage gained by incorporating a 2,000' length of lateral which would situate down dip of the present Silmonac mine workings and known ore zones. The existing haulage equipment could be employed in either "line-access" tunnel.

Adits, driven as per plan (a) or (b) would provide the additional advantage, relative to one involving an extension of the existing 4,000 (Ruth-5) level adit, of a 2,800' to 4,400' shorter raise-to-portal haulage and ventilation distance.

The approximate costs of the above alternatives is indicated by the following (comparative) estimates:

Alternative (a) - all x-cut

Access road - portal plant site excav.	$ 5,000
Purch. & Install. surf. & u.g. mine plants	156,500
4,000 level x-cut, 5,240' @ $85/ft.	445,400
4,625 level x-cut, 800 @ $85/ft.	68,000
Extension of W. Decline to 4,400 Level, 1,000' @ $110/ft.	110,000
Muck-pass, 4,400-4,050 lev., 350' @ avg. $65/ft.	22,750
Ventil./service raise, 4,050-4,400 lev. @ $175/ft.	61,250
Total (a)	$868,900

Alternative (b) x-cut/lateral

Access road - portal plant site excav.	$ 4,000
Purch. & install surf. & u.g. mine plants	156,500
4,000 x-c/lateral, 6,000' @ $85/ft	510,000
4,625 lev x-c extension, 800' @ $85.ft.	68,000
Extension of W-Decline to 4,400 lev., as above	110,000
Muck-pass, 4,050-4,400 lev., as above	22,750
Ventil/service raise, 4,050-4,400 lev., as above	61,250
Total (b)	$932,500

D - Development & Production Via An Internal Shaft

A vertical shaft collared on the 4,625 level in the hanging wall of the lode would have several advantages over an inclined shaft situated closely over or under the lode. The collar would be sited at a point about 400 feet. S.W. of the present face of the 4,625 x-cut. The collar development work would comprise about 700 feet of cross-cutting and 150 feet of raising. The shaft would be sunk to a depth of 700 feet, with stations excavated at 100 feet intervals, providing for a total of six levels at elevations 4,500', 4,400', 4,300', 4,200', 4,100', and 4,000 feet. The following is an estimate of the cost of such a shaft facility:

Collar development work	$100,000
Shaft and station excavation, timbering and station installations	400,000
Hoist, ropes, skips, power supply installed	230,000
Decline development for access to 4,500, 4,4-0 levs.	100,000
Total (capital investment)	$830,000

The time required to complete the project, including waiting time for major equipment, would range between 12 and 15 months.

The advantages accruing to the 'shaft-alternative' would be that it would allow the present development program to continue and, if necessary and the hoist capacity were sufficient it could be deepened to provide access for the development of any ore found below the 4,000 level. However, the main disadvantages of the shaft-alternative are that it could result in higher production costs by reason of additions, of perhaps $2.50-$3.50 per ton, resulting from hoisting and all-mechanical ventilation requirements. In addition, it might not have the capacity and flexibility necessary for exploration, development, and production operations over more than say, one-half of the total potentially productive length of the lode within Silmonac ground.

E. - Re-activate the Old Silmonac 4,000 Level

As was noted in the 'History' section of this report, the Silmonac 4,000 level comprising a westerly extension of the most southerly of the workings on the old Ruth No. 5 level (el. 3,996), has been inactive since 1967. The '4,000' level portal locates closely west of Sandon Creek and less than 1/4 mile due south of Sandon; it is also at about one road-mile from the Company's mill.

There are no facilities at the existing portal area; however, the existing portal bench, after a minor amount of clearing and re-grading, would appear to be large enough to accomodate a mine plant which would be at least equivalent to the present 4,625 facility.

Currently, the 4,000 level is inaccessible, by reason of at least one known 'cave' near the portal, and possibly others within a heavily timbered section situation at some 800' - 1,100' inward of it. The current estimates of the cost of re-habilitating it, are based on speculations concerning its present condition by the writer and other persons reasonably familiar with it; these, in turn were based on studies of old level plans. Hence, precise time and cost estimates, of the rehabilitation part of the project at least, are impossible.

The basic plan for the implementation of this project is: Re-habilitate, and locally improve the alignment of the tunnel over its present 7,500 foot length (Dwgs. S-1, S-2). Then, from its inner end, drive an 800 foot crosscut on such bearing as is required (S25-30°W) to intersect map point 3960N, 10,750E, which lies vertically below a point situating 275' south of the 4,625 Main X-C. From a point close to the end of the 800' x-cut, ventilation/service and muck transfer raises would be driven vertically for approximately 350 feet, or to just a few feet above the 4,400 elevation. Prior to, or during the raising operations, the main West decline would be advanced on the same -15% grade, at the requisite bearings (Dwg. S-2), to connect with both raises; the writer estimates that a decline advance of some 800 feet, or less, would be required in order to make an adequate connection with the pair of raises.

An alternative plan for the implementation of this project, and comprising one which might better coordinate with present mine development operations and provide more short range exploration opportunities, is as follows: Carry out the same general rehabilitation of the 4,000 level, but only as far as a point locating 1,400 feet back of (towards portal) its inner end. From this point,@ Portal +6,050', drive a 1,000 feet crosscut on a bearing of about S 52°W; the end of the x-cut would be at 7,050' from the portal, and with a sill elevation of approximately 4,040'. From a point close to the end of this crosscut, the ventilation/service and muck-transfer raises would be driven vertically, using a'raise-climber', for approximately 250 feet, or to just a few feet above the 4,300 elevation as the tops of the raises would locate about 75 feet S.E. of the bottom leg

(Feb./77) of the main East decline, the latter would be extended (Dwgs. S-2 & S2-A) to connect with the raises at the 4,300 (sill) elevation. The writer estimates that only about 550' of decline-advance, including some 50 feet @ 0% grade at its lower end, would be required to make this connection. The two plans compared as follows:

Item	Basic Plan	Alternative Plan
Total x-cut required, 4,000 level	800'	1,000'
Provision 'detours', if required on 4,000 lev.	300'	300'
Total, 2 raises from 4,000 level	700' 1,800'	500' 1,800'
(Total decline-advance required	800'= develop.	550' = develop)
Scooptram haul-dist. to 4,680' ramp	1,200'-2,050'	2,450'-3,000'
4,000-level train-haul dist.	8,300'	7,050'

The main advantages of the 'alternative' over the 'basic plan' include: 1) Shorter haul distance (1,250') for ore and waste transport to the 4,000 level portal; 2) The 1,000 foot development crosscut would comprise a valuable base for diamond drill exploration of dip extensions of ore zones in the east section of the mine. The principal disadvantage of the alternative plan lies in the fact that the whole decline-advance, from the ramp +2,450'-3,000', is substantially beyond the limiting range or capacity of the present Scooptram/decline development system. As this could adversely affect on-going mine operations while the low-level development is in progress, the writer thinks that the basic plan would present fewer production problems. Hence, the following estimates pertain to the basic plan -- noting that the relevant fully detailed estimates comprise appendices of this report.

Rehabilitate existing access road and portal plant site	$ 1,000
Purch. and install surf. and u.g. mine plants	156,200
Rehabilitate and improve installations 4,000 level	64,200
Drive 4,000 levl X-C, 800' of 7'x7' @ $95/ft (incl. loc. timber or extensions	76,000
Contingency for possibly required 7'x7' detours or extensions @ 4,000 lev. 300' @ $85/ft.	25,500
Extend W. Decline to 4,400 lev., 800' @ $110/ft.	88,000
Drive muck-pass 4,050-4,400 lev., 350' @ avg. $65./ft	22,750
Drive 2-cpt. serv.-ventil. rse. 4,050-4,400 lev., 350' @ avg. $175/ft.	61,250
Total Direct Costs, 4,000 Lev. Develop. Alternative	$494,900

SUMMARY

A comparison of the various exploration/development alternatives clearly indicates that 'Alternative-E', involving the reactivation of the Silmonac 4,000 (old Ruth No. 5) level, requires less risk capital; also it could, depending on timing, allow possibly profitable production operations to continue.

The proposed development program should make it possible to mine ore blocks between the 4,000-4,625 levels at a maximum profit per ton and, also, provide a convenient low-level base for efficient exploration and development of both the 2,000' and 7,000', respectively, of partly explored and developed, and totally unexplored 4,000'-4,600' vertical intervals of the flatly-dipping lode.

Currently, it is proposed to use Scooptrams to drive exploration/haulage laterals at about plus 1% grades outward of transfer/service raises, with the laterals being drive a maximum distance of 3,000' each way from the raises. In order to provide access and mine sorvices to them, the laterals would be connected by 8' x 10' declines driven, generally at minus 15% gradients. The vertical interval between laterals would be in accordance with lode dips, for level-to-level slushing distances of about 100 feet. Ultimately, in order to maintain on-going exploration and development, it would be necessary to advance the 4,000 level westward

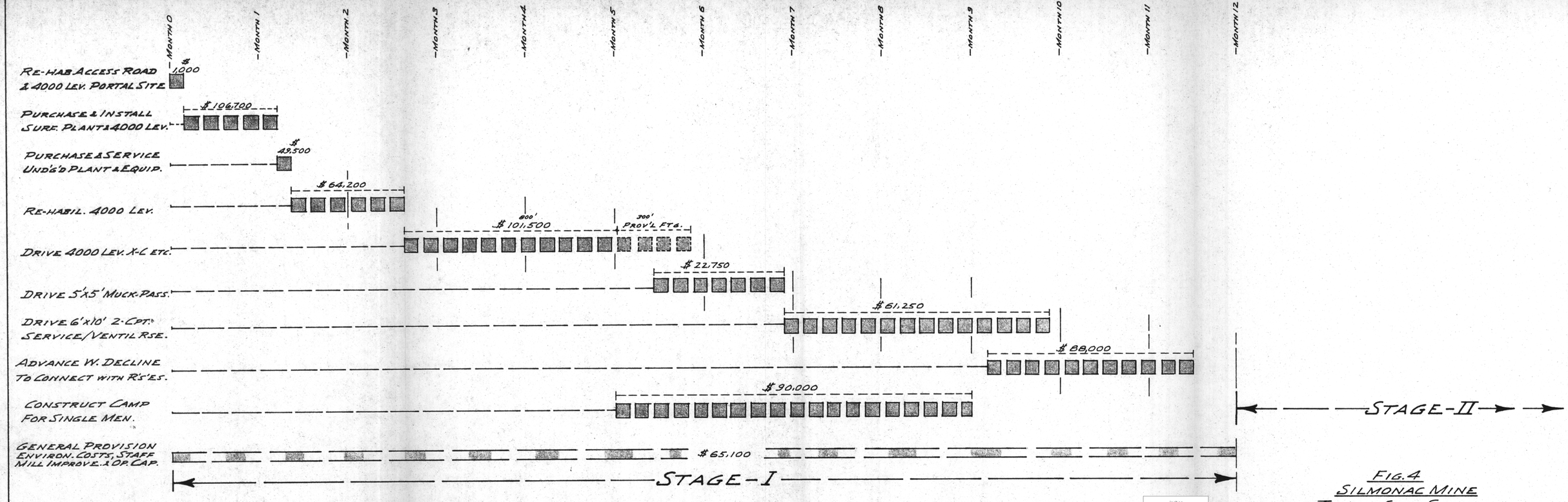


FIG. 4
SILMONAC MINE
TIME & COST SCHEDULE
for
4000 LEVEL DEVELOPMENT ALTERNATIVE

☐ = 1 FIVE-DAY WORK WEEK

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by at least another 3,000 feet and drive a second 'set' of transfer/ service raises. With this, exploration and development of the lode to the 4,800 feet elevation and over its full length within the property would be entirely feasible.

CURRENT OPERATING & MARKETING COSTS

PRELIMINARY

For present purposes, and in the absence of more definitive information on what general operational efficiencies and service and supply costs might be expected, the average mine output and cost figures accruing from the 1976 operating records comprise the basis of the following estimates. It is pointed out that although costs deriving from the average 1976 Scooptram/decline exploration and extraction operations-- these operations being at, or beyond their recognized limits of efficiency--may be disproportionately high, they are at least partly counterbalanced by the disproportionately lower diamond drilling footages and costs incurred during the 1976 year.

Before actually compiling the following cost-table, the 'constant' and 'variable' (tonnage-related) components of each cost-item, as presented in the mine accounting reports, was estimated. Some of the component costs are assumed to be 'constant' if they are only minimally affected by increases in the rate of mine production. Also, as future circumstances, other than general inflation, may eventually require that they be adjusted upwards or downwards, they are considered as being 'constant' only in their present context. The following cost estimates are based on the 1976 operating cost and performance data:

ESTIMATED CURRENT OPERATING COSTS

Basis S.D.Tons Milled Per Month	$ Explor. & Extrac.	$ Mine Sup. Explosive & Other	$ Mine Services	$ Milling	$ Mine-Mill Ore Haul & S. Pile	$ Mine Offices & General	$ Total Operating Costs	$/ton Total Op-Costs
1,500	20,576	12,150	33,000	19,805	1,875	19,962	107,368	71.58
2,000	23,936	16,200	37,500	22,305	2,500	19,962	122,403	61.20
2,500	28,976	20,250	41,500	24,625	3,125	19,962	138,438	55.38
3,000	34,016	24,300	45,000	26,765	3,750	19,962	153,793	51.26
3,500	39,056	28,350	48,000	28,725	4,375	19,962	168,468	48.13
4,000	44,096	32,400	50,500	30,505	5,000	19,962	182,463	45.62

The above table indicates that a doubling of the production rate from, say, 2,000 t.p.m. to 4,000 t.p.m. could be accomplished with slightly less than a 50% increase in operating costs. It is expected that substantial increases in operating efficiency and profitability would soon become evident as a result of the conversion from the present Scooptram/decline exploration-mining system to one based on Scooptrams operating on horizontal laterals and connecting declines.

Also in regard to the above table, it is noted that the amounts under the heading 'Mine Office & General' include a $3.00 per ton royalty (incl. w. 'General Expense') to pay off a $400,000 mortgaged cash advance already made by Kam-Kotia; hence the amounts under the last two columns also include this $3/ton cost.

The maximum capacity of the mill,as presently set up is about 4,000 tons per month.

VALUATION OF CURRENT MINE PRODUCTION & RESERVES

PRELIMINARY

Both the probable and possible ore reserves are estimated to grade:

Ag-16.43 oz/ton, Pb-5.8%, Zn-5.9%, Cd-0.048%

On the basis of the information at hand, the writer has computed the following metallurgical performance factors relating to the Sandon ore concentrating facility, as presently set up, and as they relate to certain operating periods:

GROSS RECOVERIES OF METALS FROM MILLFED

Period Computed	% of Present Max Operating Capacity	% Total Ag	% Total Pb	% Total Zn
1970-76, incl.	2 yrs. @ 60-80, 5 yrs. under 50	95.3	96.7	92.7
1971-72, incl.	80 to 60	95.43	96.21	93.75
1976	under 50	97.0	96.01	91.63

DISTRIBUTION OF METALS BETWEEN Pb & Zn CONCENTRATES

Period Computed	% Silver to Pb Conc.	% Silver to Zn. Conc.	% Lead to Pb Conc.	% Lead to Zn Conc.	% Zinc to Pb Conc.	% Zinc to Zn Conc.	% Cd
1970-76 Inc.	58.9	41.1	98.5	1.5	13.0	87.0	follows Zn
1971-72 Inc.	55.0	45.0	98.4	1.6	11.7	88.3	" "
1976	64.5	35.5	98.4	1.6	17.4	82.6	" "

Based on the long-term metallurgical performance of the Sandon mill, with due allowances for the effects of running at optimum or sub-optimum loads and for technical improvements possibly made, the following metallurgical performance factors would appear to be applicable to the larger through puts anticipated in future operations:

Gross Recoveries: Ag = 96%, Pb = 96.5%, Zn/Cd = 92%

Distribution of Recovered Metals:

Ag to Pb Concentrates = 60%
" " Zn " = 40%
Pb to Pb Concentrates = 98.4%
" " Zn " = 1.6%
Zn/Cd to Pb Concentrates = 12.5%
" to Zn " = 87.5%

On the basis of the above performance factors, it is expected that the milling of 100 tons of ore of a grade equal to that of the current ore

reserves, or 100 tons @ Ag = 16.43% oz/ton, Pb = 5.8%, Zn = 5.9%, Cd, 0.047%, will return:

100 Tons of Ore Contain	Mill Recovery	Total Metal Recovered in Concentrates	Metal Recovered in Pb Concentrates	Metal Recovered in Zn Concentrates
Ag - 1643 oz.	96.0%	1577 oz.	946 oz.	631 oz.
Pb - 5.8 tons	96.5%	5.6 tons	5.51 tons	0.09 tons
Zn - 5.9 tons	92.0%	5.43 tons	0.68 tons	4.75 tons
Cd - 0.047 tons	92.0%	0.04 tons	0.005 tons	0.035 tons

After some preliminary metallurgical balancing of the above figures, the following concentrate grades are interpreted:

Pb Concentrate: 107.4 oz/ton Ag, 62.54% Pb, 7.72% Zn.
Zn Concentrate: 70.9 oz/ton Ag, 53.34% Zn,(1.02% Pb), o.40% Cd.
Further, 100 tons of ore of 'reserve' grade yields

$$\frac{5.51}{.6254} = 8.81 \text{ tons Pb Conc.}$$

and $\frac{4.75}{.5334} = 8.90$ tons Zn Conc.

Thus, ratio of concentration $= \frac{100}{17.71} = 5.65$

Net Smelter Value - Lead Concentrates

(Prices @ April 26/77: Ag = 4.966 Can. $/oz; "Calc." Pb = 31.4 Can. ¢/lb; Zn = 37.86 Can ¢/lb.)

Payments (per Cominco-Amalgamet Schedule) per dry ton:

Ag, 107.4 oz x 93% x $4.88 net	$ 487.42
Pb, 62.54% x 92% = 1150.7# x $0.246/lb., net	283.07
Zn, 7.72% x 60% = 92.6# = 92.6# x $0.228/lb., net	21.11
Gross Payments	$ 791.60

Deductions per dry ton

Basic treatment charge	$ 42.50
Moisture penalty, @ 9.5%	0.60
Rail car rental, estim. $140/40 tons	3.50
Rep. and assaying, estim.	1.00
B.M.C. Commission, estimate	8.00
Total Marketing Charges	$ 55.60
N.S.V. Pb Concentrates, F.O.B. Trail, B. C.	736.00
Less: Trucking Charge @ 10.50/.905	11.60
N.S.V. Pb Concentrates/dry ton F.O.B. Sandon/mill	$ 724.40

Net Smelter Value - Zinc Concentrates

(Prices @ April 26/77: Ag = 4.77 U.S. $/oz; Zn = 37.0 U.S. ¢/lb; Cd = 3.00 U.S. $/lb.) Each $1.00 U.S. = $1.05 Can.

Payments (per Bunker Hill - Amalgament Schedule)

Ag, 70.9 oz x 80% x $4.95, net	$ 280.76
Zn, (53.34 - 8.00) % = 906.8# x $0.383/lb. net	347.30
Cd, 0.40% x 70% - 3# = (5.6 - 3.0) # x $2.62/lb. net	6.81
Gross Payments	$ 634.87

Deductions per dry ton

Basic treatment charge	$ 140.00
Iron penalty, estim.	3.85
Rep. & Assaying, estim.	1.80
B.M.C. Commission, estim.	5.60
Total Marketing Charge	$ 151.25
N.S.V. Zinc Concentrates, F.O.B. Kellog	483.62
Less: Trucking charge, @ $22.50/.905	24.86
N.S.V. Zinc Concentrates/dry ton,F.O.B.Sandon/mill	$ 458.76

NET SMELTER VALUES OF METALS IN CONCENTRATES, F.O.B. MILL:

Metal	$ Pay-Value of Metal in Pb+Zn Conc.	$ Prop of Marketing & Trucking Charges	$ Net Smelter Value of Metal in Pb+Zn Conc.	Gross Units of Metal in Concentrates	Net Smelter Value per Unit of Metal
Silver	768.18	0.00	768.18	178.3 oz	$4.31/oz
Lead	283.07	62.54	220.53	1271.1#	17.35¢/lb.
Zinc (+Cd)	375.22	180.77	194.45	1221.2#	15.92¢/lb.

Net Recovered or Mill Value - Ore Reserves

Basis: Ore @ Ag = 16.43 oz/ton, Pb = 5.8%, Zn = 5.9% (+ assoc. Cd).
Gross Metal Recoveries @ Ag = 96%, Pb = 96.5%, Zn/Cd = 92%.

Millhead Ore Grade	Net Smelter Value per Unit of Metal	Net Smelter Value of Contained Metal
Ag @ 16.43 oz/ton	$ 4.31	$70.81 per dry ton
Pb @ 5.8% or 116#	17.35¢	20.13 " " "
Zn (+Cd) @ 5.9% or 118#	15.92¢	18.79 " " "
	Total	$109.73 per dry ton

Allowing for mill-losses:

N.S.V. of Contained Metal		Mill Recovery	Net Recovered or Mill Value	Net Mill Value per Unit of Metal
Ag, $70.81	X	96.0%	$ 67.98/dry ton	$4.14 Can/Troy oz.
Pb, $20.13	X	96.5%	$ 19.43/ " "	$0.167 Can/lb.
Zn (+Cd), $18.79	X	92.0%	$ 17.29/ " "	$0.16 Can/lb.
			$104.70/ dry ton	

Per check-calculation as above:

100 dry tons of ore milled yields 8.81 tons Pb Conc. @ 724.40 = $ 6,381.96
8.90 tons Zn Conc. @ 458.76 + 4,082.96
$10,464.92

Hence, net recovered (mill) value per 1 ton of dry ore $ 104.65

The difference of 5¢/dry ton between the two estimates is due to minor approximations made in the respective calculations. The accepted value for use herein is $104.70 per dry ton.

FUTURE METAL-PRICE CONSIDERATIONS

GENERAL

The quantity and value of Canadian production of the non-fuel metallic minerals will, as in the past, be determined largely by the general economic, and particular supply/demand conditions existing in the countries which comprise Canada's principal export markets. Foreign, and particularly the U. S. demand for silver, lead and zinc was reasonably strong for much of 1976. In view of the prospects for continuing economic growth in the above designated countries, and by reason of the fact that mineral/metal demand usually lags behind an expansion in economic activity, the demand for Canadian non-fuel minerals, including silver, lead, and zinc should continue to increase during and beyond 1977. Also, the recent reduction in the value of the Canadian dollar relative to the U.S. dollar should improve the competitive position of Canada's metal and mineral exporters and producers. It is expected that this benefit will continue at the same, or to an even greater degree through 1977, at least.

SILVER

The Free World silver demand in 1976 is estimated to have increased by some 7-8 percent over that of 1975. For the past several years there has been a major short-fall between new, or primary silver production and the consumption of silver from all sources. The short-fall has been met by sources such as stockpiles, coinage, scrap, and recycled products or articles. These sources are not unlimited, but it is expected that the demands of a generally growing market will eventually force increases in production from these sources, and thus tend to deplete them over the long term.

Mineral reviews and forecasts contained in recent trade journals studied by the writer indicate that:

(a) There is little chance that important amounts of silver will be released from the U.S. strategic reserve during 1977.

(b) Industrial demand for silver is expected to increase, while that for coinage is expected to remain about the same in 1977.

(c) Continuing demand for the metal as a 'hedge' against depreciating paper currencies, speculative interest, and other factors all indicate higher, or at least equivalent prices during 1977; over the long term this same demand will cause a general upward movement in its price, with characteristic short-term fluctuations.
(d) The Canadian silver price is expected to be largely dominated by the U.S. market price, but with the added benefit of a continuing, and perhaps increasing Can./U.S. dollar exchange rate.
(e) For 1977, the prospects for a price increase presently appear to outweight those pointing to a price decrease.
(f) The industrial demand for silver is expected to increase significantly over the long term as a result of additional uses found by research.
(g) Silver consumption should continue to exceed the production of primary silver by a wide margin, since some 80% of new silver is produced as a by-product of other metal production, which tends to limit the amount that is actually available from this source.
(h) It is expected that the long-term price trend for silver will be upward and very possibly more so than that expected for the principal base metals.

On the basis of the general market opinion, it is expected that:
(a) Over the near-term or say, the next year, that the silver price should exceed the 1974 mean high and the 1975 high value of $5.20 U.S. per troy ounce, and reach and maintain a price level between its 1974 eight-month and four-month 'mean-highs' of $5.20 and $5.80 per oz., respectively, or say, $5.40-$5.50 U.S./troy oz.
(b) Over the longer term, i.e., 1978-1982, the silver price should continue to rise, although by smaller increments and with some short term fluctuations above and below the general price trend-line.

LEAD

World lead consumption in 1976 was up approximately 11% over that of 1975, despite the decreasing amounts used in gasoline production. Battery manufacturers consumed most of the lead sold during 1976, or about 53% of the total. Increased useage in this quarter is anticipated by reason of the strong public acceptance of the new 'maintenance-free' battery

which was introduced, generally, during 1976. An additional demand for lead is expected over the longer term as a result of the increasing amounts of research being done towards the development of acceptable battery-powered vehicles.

During 1976 the U. S. lead price increased from 19.0¢ to 25.8¢ per lb. The lead market has continued strong through April, 1977, with the fourth producer price hike of the year occurring during that month. Impetus for this hike was supplied by the LME, where lead was selling at a premium over the U. S. producer price.

For the short term, there doesn't seem to be any reason to expect anything other than the present firm lead market and prices. For the longer term, shortages of lead, are expected to occur from time-to-time. From the mining side, new mine output will be needed to satisfy a continued growth in world demands. From the smelting and refining side, new treatment plants will be required to meet the increasing, growth-related demand, and expensive modifications to current plants will be required. Hence, over the longer term, these requirements will all tend to force lead prices upward. It is expected, then, that the over-all price trend for the next five years should be upward, in spite of the temporary downward fluctuations which are normal and expectable.

ZINC

The production and consumption of zinc has increased steadily for the past ten years, generally in balance. Actual mine production has increased from just under four million tons in 1965, to about 5.5 million tons in 1975. With this, the major zinc producers have controlled production to keep in line with consumption, and price has been mainly related to production costs. Currently zinc is in ample supply; however, all production costs continue to increase. Supplies for the longer term appear to be more than adequate but, if costs continue to increase, some upward adjustment in price over the present 37¢/lb. level should be expected over the next few years.

A prominent trade journal notes that U. S. consumption during 1976 amounted to 23% more than that in 1975. This high U. S. growth in consumption, in conjunction with an inadequate domestic production, resulted in a highly competitive market. As a result, heavy imports of foreign (incl. Canadian) zinc were required. This journal also predicts a general increase in consumer demand, mainly through construction, machinery, domestic applicances, and electronic equipment, rather than through car-truck manufacturing as in the past.

In summary, it is expected that the lead and zinc prices and marketing charges will hold at their present levels and, if their prices continue to advance, the advances will be by amounts at least sufficient to compensate the producer for possible escalations of current marketing charges.

FUTURE PRODUCTION COST CONSIDERATIONS

The most obvious of the several factors affecting profitability comprise the grade of ore reserves, mining dilution and hence millhead grade, metal prices, exploration and development costs per ton of ore milled, and the production cost. The latter, which is a 'composite cost', and controllable within limits, is the factor considered in this section of the report.

The production cost is made up of two distinct costs, marketing cost and mine operating cost; the first is controllable within narrow limits, and the second, which includes several 'variable' costs, is controllable over much wider limits. Each of the components of the total (mine/mill) operating cost is to a greater or lesser extent affected by the rate of production at the general operation; hence can be considered as essentially 'variable' or 'fixed', in relative terms. In addition, some of the components of the operating cost reflect, to a greater or lesser degree, the effect of the prevailing labour rates or service/supply charges and prices. The writer has attempted to analyze these on quantitative bases for the estimates presented in the following table.

TABLE: CURRENT & PROJECTED OPERATING COSTS

(in $ per month; $ per short dry ton; % per year)

S.D.T. MILLER PER MONTH		MINE LABOUR TO EXPLORATION DEVELOPMENT EXTRACTION	MINE SUPP. & OTHER	EXPLOS.	MINE SERVICES	MILLING	MINE-MILL ORE HAUL & S-PILE	MINE OFFICE	GENERAL	TOTAL OPERATING COSTS
2000	Current:	23,936	10,240	5,960	37,500	22,305	2,500	5,750	14,212	122,403
	+ 8%		+ 15%	+ 10%	+ 9%	+ 9%	+ 10%	+ 6%	+ 6%	61.20/T.
	Project:	25,850	11,776	6,556	40,875	24,312	2,750	6,095	15,065	133,279
										66.64/T.
2500	Current:	28,976	12,800	7,450	41,500	24,625	3,125	5,750	14,212	138,438
	+ 8%		+ 15%	+ 10%	+ 8%	+ 8%	+ 10%	+ 8%	+ 7%	55.38/T.
	Project:	31,294	14,720	8,195	44,820	26,595	3,438	6,210	15,207	150,479
										60.19
3000	Current:	34,016	15,360	8,940	45,000	26,765	3,750	5,750	14,212	153,793
	+ 8%		+ 15%	+ 10%	+ 7%	+ 7%	+ 10%	+ 10%	+ 8%	51.26/T.
	Project:	36,737	17,664	9,834	48,150	28,638	4,125	6,325	15,349	166,822
										55.61/T.
3500	Current:	39,056	17,920	10,430	48,000	28,725	4,375	5,750	14,212	168,468
	+ 8%		+ 15%	+ 10%	+ 6%	+ 6%	+ 10%	+ 12%	+ 9%	48.13/T.
	Project:	42,180	20,608	11,473	50,880	30,448	4,812	6,440	15,941	182,332
										52.09/T.
4000	Current:	44,096	20,480	11,920	50,500	30,505	5,000	5,750	14,212	182,463
	+ 8%		+ 15%	+ 10%	+ 5%	+ 5%	+ 10%	+ 14%	+ 10%	45.62/T.
	Project:	47,624	23,552	13,112	53,025	32,030	5,500	6,555	15,633	197,031
										49,26/T.

The projected % cost increases shown on the table have been derived from observed cost increases over the past five years. However, as these costs have in no way increased on a straight-line basis from year-to-year, it is by no means certain just how they will change even in the near future. Hence, the projected % cost increases comprise only short-term, or "1-year" assumptions.

With the above, lead and zinc prices are expected to stay at about their present levels, or to only rise by amounts necessary to compensate the producer for any increases in marketing charges. However, the anticipated trend in future silver price indicates an increase from $4.73 U.S./troy oz., the price used in the present calculations, to about $5.50 U.S./troy oz., or by about 16%. As silver accounts for 65%-70% of revenue from concentrates, the 'effective' increase would be in the vicinity of 10% - 11%, and appreciably above the correspondingly indicated increase in total operating costs.

Generally, production costs, at least over the near-term, are not expected to increase at as high a rate as they have been doing over the past few years. Also, it is generally expected, that if significant increases in metal prices do occur, the silver price is more likely to out-pace those for lead and zinc, by reason of the fact that total silver consumption continues to be greater than new production of the metal, at least within the main industrial economies.

NET CASH FLOW PROJECTIONS

The net cash flow analyses are necessarily based on the net mill value of the probable and possible ore reserves, the tons milled per day or month, and the total operating cost expected at a particular production rate. The mill values of the ore and the cost projections are based on careful interpretations of the Silmonac production records, and are believed to be fairly accurate.

Following the completion of the proposed 4,000 level based development program, and the conversion of the present Scooptram/decline based mining system to one utilizing the present Scooptram capacity on a system of (main) horizontal laterals and connecting declines, it is fully expected that the three '3-ton' Scooptrams will provide sufficient direct and back-up muck-handling capacity for a 3,500-4,000 tons per months mill through-put. In order to emphasize the sufficiency of the currently operating Scooptrams for this purpose, part of the data presented earlier in this report is herewith repeated:

OPERATING RADIUS	CAPACITY OF 1 SCOOPTRAM PER 2-SHIFT DAY (Operating-hr. - 50 min.) (Operating-shift = 6½hrs.)
1,000 ft.	430 tons
2,000 ft.	262 tons
3,000 ft. (max. proposed)	188 tons

Hence, capacity of 2 Scooptrams = 376 tons per 2-shift day. Mill through-put: 4,000 tons per month = 186 tons per 2-shift mine-day. Information on past mine operations indicates that an approximately equal tonnage of waste will accrue from exploration/development operations, resulting in an ore and waste total of, say, 372 tons per day. As is indicated by the tabulations above, this is less than the capacity of 2 Scooptrams operating at the maximum operating radius proposed and well under their combined capacity at any shorter haul distance.

The following net cash flow projections are based on production from the estimated ore reserves, grading:

Ag, 16.43 troy oz/dry ton; Pb, 5.8%; Zn, 5.9% (+Cd).

This represents the average grade of all Silmonac ore milled to date and, consequently includes an average amount of mining dilution:

1)

Projected Dry Tons Milled per Month	Calculated Recoverable Value $ per Dry Ton	Total Operating Cost $ per Dry Ton	Projected Net Cash Flow $ per Month
1,500	104.70	71.58	49,680
2,000	"	61.20	87,000
2,500	"	55.38	123,300
3,000	"	51.26	160,320
3,500	"	48.13	197,995

In the event that a significant portion of the ore reserves are made up of (ore) bodies or 'blocks' containing ore widths (thicknesses) which are less than the general average of those mined to date, a dilution factor, comprising a 'safety factor', is introduced in to the following calculations. With this, it is suggested that a two foot over-break might be anticipated. This, on top of the average five foot width used in the ore reserve calculations, results in a 40% dilution, volume basis. With the volume/tonnage factors of 10 and 12 c.f./ton applying to ore and waste, respectively, the resulting dilution on the basis of weight is 10/12 x 40, or about 1/3. Hence the net recoverable value of the reserve-grade millfeed becomes 3/4 x $104.70 = $78.52/dry ton. Net cash flow calculations on this ore grade follow:

2)

Projected Dry Tons Milled per Month	Calculated Recoverable Value $ per Dry Ton	Total Operating Cost $ per Dry Ton	Projected Net Cash Flow $ per Month
1,500	78.52	71.58	10,410
2,000	"	61.20	34,640
2,500	"	55.38	57,850
3,000	"	51.26	81,780
3,500	"	48.13	106,365

Following introduction of the proposed mining system, it is expected that a mill through put of 36,000 tons per year, at least, would be quite attainable. This, applied to the estimated 48,855 tons of probable ore reserves, would provide about 1 1/3 years of production and net cash flows

totalling 16 x $160,320, or approximately $2,560,000. At the 'diluted' grade, they would total about $1,308,000, or probably sufficient to amortize the cost of the proposed 4,000 level development program.

However, the profit potential of the possible ore reserves comprises the ultimate target of the proposed development program and the new mining system that would be structured on it, as is indicated below:

Possible Gross Ore Reserves:

a) @ average mined-grade to date---550,000 tons, approx.

b) @ a minimum foreseable grade equal to 3/4 of the avg. mined-grade to date---733,000 tons, approx.

On the basis of the probable fluctuations of the development/production rate that might be expected over the life of the operation, the long-term average production rate is conservatively inferred @ 36,000 tons per year. Therefore, on the basis of the above estimates, the ore reserve or mine 'life' could range between 15 1/2 and 20 1/3 years. Also, from the above, the net cash flow potential contained within the estimated range of ore reserves would range between (a) 15 1/2 x 12 x $160,320 and (b) 20 1/3 x 12 x $81,780, or between approximately $20,000,000 and $30,000,000 over this 15-20 year mine life, as based on the current estimates and projections.

Respectfullly yours,

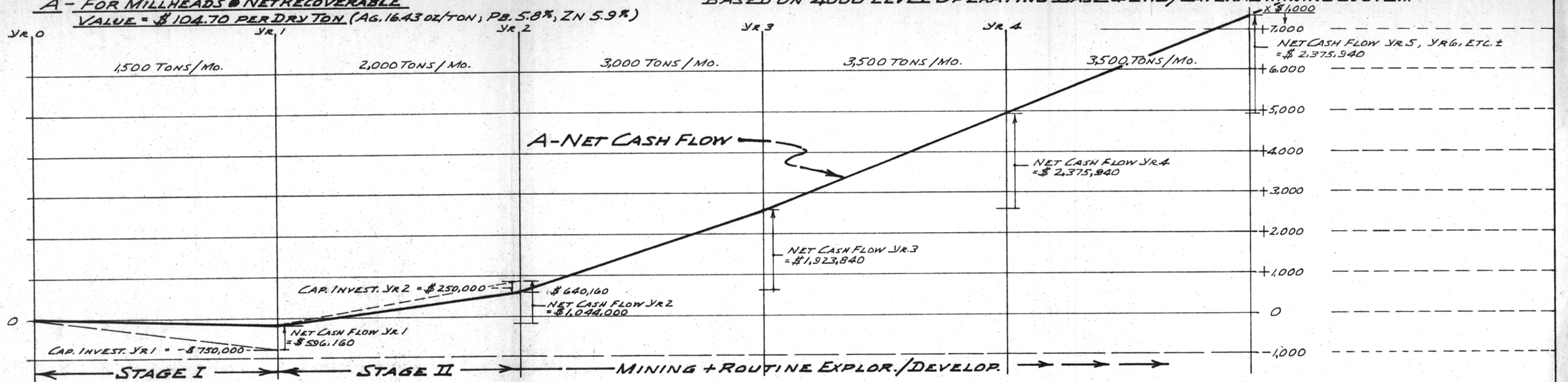
W. M. SHARP, P.Eng.

May 8, 1977
North Vancouver, B. C.

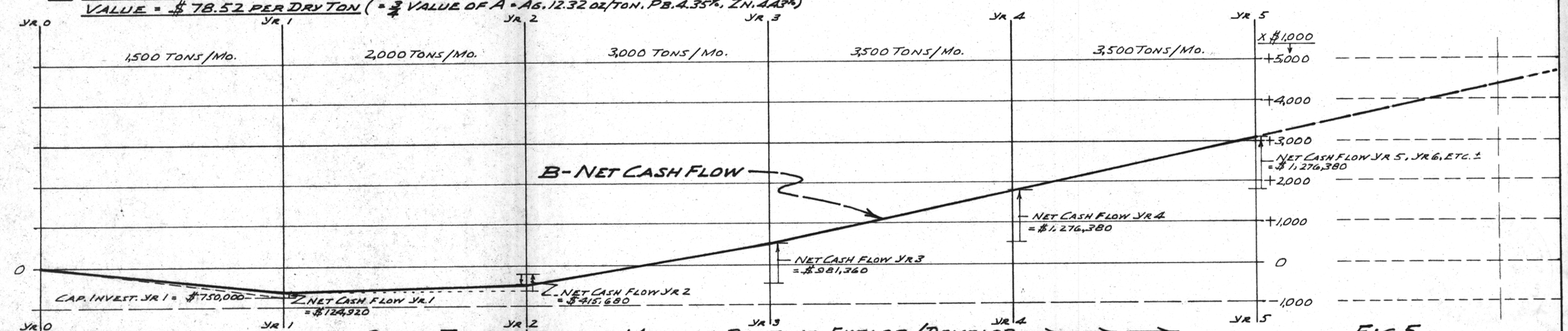
PROJECTIONS: NET CASH FLOWS.

BASED ON 4000 LEVEL OPERATING BASE & LHD/LATERAL MINING SYSTEM

A - FOR MILLHEADS @ NET RECOVERABLE VALUE = $104.70 PER DRY TON (AG. 16.43 OZ/TON; PB. 5.8%, ZN 5.9%)



B - FOR MILLHEADS @ NET RECOVERABLE VALUE = $78.52 PER DRY TON (= ¾ VALUE OF A = AG. 12.32 OZ/TON. PB. 4.35%, ZN. 4.43%)



NOTE: NET CASH FLOW = REVENUE FROM CONCENTRATE SALES − MINE + MILL CASH OPERATING COSTS (BEFORE DEPRECIATION, DEPLETION, & TAXES).

FIG. 5

SILMONAC MINE

NEW DENVER B.C. SLOCAN MIN. DIV.

MAY, 1977 W.M. SHARP, P.ENG.

CERTIFICATE

I, WILLIAM M. SHARP, with business and residential addresses in North Vancouver, British Columbia DO HEREBY CERTIFY THAT:

1. I am a graduate of the University of British Columbia with a M.A.Sc. (1950) degree in Geological Engineering.

2. I am a Registered Professional Engineer in the Province of British Columbia, Reg. No. 2164.

3. I have practiced my profession since 1950, and as a Consulting Geological Engineer since 1964.

4. I have personally examined the surface and underground geology, ore exposures, workings, maps and records of the Silmonac mine and it's operations since 1964 via periodic visits; the most recent one made during February 7-14, 1977.

5. This report is based on my personal examinations, records, and reports previously made and submitted, Government geological reports, company records, and technical data and relevant information provided by the management and staff of Kam-Kotia Mines Limited.

6. I have no direct or indirect interest in the property or securities of either Silmonac Mines Ltd. or Kam-Kotia Mines Limited, nor do I expect to acquire any such interest in them.

W. M. Sharp

W. M. SHARP, P.Eng.

North Vancouver, B. C.
May 8, 1977

APPENDICES

Estimates: Surface Mine Plant, 4,000 level
Underground Mine Plant, 4,000 level
Rehabilitation Costs, 4,000 level
Basic Plan, 4,000 Lev. Exploration & Development

Maps in Pocket

Dwg. No. S-1 Plan-Geology along Main Lode
Dwg. No. S1-A, Long. Vert. Projection-Main Lode Mines & Geology
Dwg. No. S-2, Plan-Mine Workings Geology, & Ore Zones
Dwg. No. S2-A, Long. Vert. Projection-Mine Geology & Ore Zones, Proposed Development.
X-Sec. E-1, Silmonac Mine
X-Sec. W-1, " "
X-Sec. W-2, " "

SURFACE MINE PLANT --- 4,000 LEVEL	SILMONAC	
1. Preliminary		
Rehab. Access Rd., Grade portal bench, D-6, 3 days @ $120	$ 360.00	$
Clearing and brushing - 4 man-days @ $65.36, approx.	262.00	
Surface portal bench, gravel, 2 days truck/loader @ $150	300.00	
Miscellaneous	78.00	1,000
2. Machinery & Structure		
Foundations, general allowance	1,000.00	
Compressors, 1,000 c.f.m. and air receiver, pipes, etc.	32,000.00	
Elec. Power, 60-70 KVA and panels	8,500.00	
Battery charger, locie	1,000.00	
Miscellaneous shop tools and equipment	2,500.00	
1-2,000 gal. tank, compl:	1,285.00	
1-1,000 gal. tank, compl:	596.00	
1-500 " " "	307.00	
1-powder mag. all steel	5,000.00	
Freight, Van-Site -- 22,000#	1,100.00	
Shop, 20' x 24' pre-fab. steel, deliv. & installed	16,500.00	
Dry, 8-men, incl. 10' x 10' office deliv and installed	17,000.00	
Miscell. sheds and structures, estimated @	2,000.00	
Mine Ore Bin, 150 tons, materials and construction	5,000.00	
Erection, avg. 2 'miners'/1 mo. - 44 sh x 69.36 + extras	3,212.00	
Contingencies and omissions, @ 10%	9,700.00	106,700
TOTAL SURFACE PLANT		$107,700
UNDERGROUND MINE PLANT -- 4,000 LEVEL		
1. Equipment		
2-3 1/2 ton Titan locie c/w 2 batts.; 1 spare W. 1 batt.	$21,250.00	
10-50 cu. ft. (rocker-dump) cars @ $875	8,750.00	(or 12-40's)
1- Eimco '21' mucker (Vert. Clearance 8' plus	10,000.00	
2- J.L. drills, cpl.w. hoses, lubr., etc.	5,000.00	
Miscellaneous drill tools, fittings, etc.	1,000.00	
~~See written text~~ Freight, Van to site, 39,000#	1,260.00	
Provision for omissions and contingencies, estim. @ 5%	2,240.00	49,500
TOTAL CAPITAL COST OF MINE PLANT, SURF. 2 UNDERGROUND		$157,200
TOTAL REHABILITATION EXPENSE		64,200
TOTAL, BASIC PLAN, 4,000 LEVEL ALTERNATIVE		273,500
Sub Total @ Current Cost Levels		494,900
Contingency Allowance for additions and inflation, 20%		100,000
Provision for Camp for single men		90,000
General provision for waste control, mill improvements additional staff, and Supplementary operating capital, @ 10% approx.		65,100
TOTAL FOR 4,000 LEVEL DEVELOPMENT PROGRAM		$750,000

W. M. Sharp & Co.

ESTIMATED REHABILITATION COSTS - 4,000 LEVEL

Preliminary

Operate 25 shifts/day - Estim. 30 work-days (605 shifts) required.
Basic Underground Crew, Each shift: 3 miner/timbermen @ $80/day.
Estimate re-timber 2 sets (10') per shift in lightly caved sections.
1 set (5') " " " heavily " "
Estimate re-new or re-lay 160'/shift by supplementary crew, as required.

DIRECT COSTS

Labour	(a) Timber 50 light sets	25 shifts	
	28 heavy sets	28 "	
	(b) Trackwork, 7,700' @ 160'/sh.	48 "	
	(c) Replace 2,000' of 4" air-line 2,000' of 2" water-line	3 "	
	(d) Install. 3,200' of Vent-Tube	4 "	
	(e) Re-hab. Water Supply	1 "	109 shifts

Total Labour, 109 x 3 = 327 man-shifts @ $80.00 $ 26,160

Material and Supplies

(a) Timber 50 sets @ 300 bd. ft. = 15,000 28 sets @ 500 bd. ft. = 14,000 29x120	$ 3,480
(b) 24 tons 20# rail and plates and bolts	14,460
3,000 ties	2,200
(c) 2,000'-4" pipe and couplings	3,600
2,000'-2" " " "	1,700
(d) 4,200'-18" vent-tube	3,150
(e) 3-19" fans	1,500
Total Material & Supplies	$30,090

Mine Services

Base on 30 days to complete rehabilitation:

Compress air and power, 160 g.p.d. x 30 x 0.54	$ 2,590
Lubricants, @ 5% of fuel	130
Mechanic/comprex op. $70 x 30	2,100
Supervision, @ proportion of total for mine	1,200
Equipment rentals, truck, mine locie, etc., 30 days	1,500
Truck fuel and lube, 5 g.p.d. x 30 x 0.86	130
Reapirs and parts, rate @ $10/day	300
Total Mine Services	$ 7,950
TOTAL REHABILITATION EXPENSE	$64,200

BASIC PLAN: 4,000 LEVEL EXPLORATION-DEVELOPMENT

Drive 350' - 5' x 5' Bare Raise for Muck - Pass - 60 shifts or 30 work

Raise Crew -- 1 miner, 1-6' round/shift. 250 cu. ft. broke (5 cars)

Support Crew -- 1/2 sh. miner on mucking machine and local tram to switch!
1/4 sh. motorman: haul 1/2 train load, & provide service.

Mine Services -- Estim. 50% of amount charged to drift.

Overhead -- Estim. 50% of amount charged to drift.

DIRECT COST		6 ft.	per ft.
Labour - 1 miner @ $80.00/sh.	$80.00		
1 miner @ 1/2 x $80.00/sh.	40.00		
1 motorman @ 1/4 sh. @ $65.00	16.25	$136.25	$ 22.71
Supplies			
Explosives, 40% x $64.00	25.60		
Steel, " x $ 5.42	2.17		
Bits, " x $12.44	4.98		
Pipe, tempor 2" x 1" (6 x 1.50)	9.00	$ 41.75	6.96
Rental on Alimak - Platform	$24,000		
Rail, 350' @ $60.00	21,000		
Per month	$ 4,500 x 6/350	77.14	12.86
Mine Services - @ 50% x 24.50			12.25
Overhead, min - @ 50% x 11.25			5.62
Total for 5' x 5' bare raise			$ 60.40/ft.

Drive 350' - 6' x 10' Timbered 2-cpt. Raise for Service & Ventilation

Possible method 1. drive 6' x 6' pilot-riase to 4400 level; with rock-bolt support.
2. slash to full size and timber; also using Alimak.

1. Drive - 6' x 6' pilot raise through to 4,400 level:		6 ft.	per ft.
Labour			$ 22.71
Supplies			
Explosives, 60% x 64.00	$38.40		
Steel " x 5.42	3.25		
Bits " x 12.44	7.46		
Pipe, tempor. 2" & 1"	9.00	$ 58.11	9.68
Rental on Alimak			12.86
Mine Services @ 50% x 24.50			12.25
Overhead @ 50% x 11.25			5.62
Sub-Total for initial 6' x 6' pilot raise			$ 63.12/ft.

Drive 350' - 6' x 10' Timbered 2-cpt. Raise for Service & Ventilation

			11.7'	per ft.
2. a.	Slash 1 to 6' x 10' (i.e., 4' x 6' slash x 12') and muck 9 cars			
	Labour - 1 miner @ $80.00	$80.00		
	1 motorman 1/2 shift @ $65.	32.50	112.50	9.62
	Supplies			
	Explosives 2/3 x 64.00	42.88		
	Steel " x 5.42	3.63		
	Bits " x 12.44	8.33		
	(Pipe carried with timber)	-	54.84	4.69
	Rental on Alimak (30 days)			12.86
	Mine Services @ 50% x 24.50			12.25
	Overhead @ " x 11.25			5.62
b.	Timber 2 sets, using Alimak, rental included in above:			
	Labour 2 miners @ $80.00	$160.00		
	1 motorman, service etc. @ $65	65.00	225.00	19.23
	Supplies			
	Timber, estim. 1,700 hd. ft @ $120/M =	204.00		
	Spikes and hardware @ $5.00	10.00	234.00	20.00
	Mine Services - @ 50% x 24.50			12.25
	Overhead - @ 50% x 11.25			5.62
	Sub-Total for Slashing and Timbering			$102.14/ft
	TOTAL - 6' x 10' Timbered 2-cpt. Service/Vent. Raise			$165.26/ft

ESTIMATED REHABILITATION COSTS - 4,000 LEVEL

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Equipment rentals, truck, mine locie, etc., 30 days	1,500
Truck fuel and lube, 5 g.p.d. x 30 x 0.86	130
Reapirs and parts, rate @ $10/day	300
Total Mine Services	$ 7,950
TOTAL REHABILITATION EXPENSE	$64,200

W. M. Sharp P. Eng.

BASIC PLAN: 4,000 LEVEL EXPLORATION-DEVELOPMENT

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Pipe, tempor. 2" & 1"	9.00	$ 58.11	9.68
Rental on Alimak			12.86
Mine Services @ 50% x 24.50			12.25
Overhead @ 50% x 11.25			5.62
Sub-Total for initial 6' x 6' pilot raise			$ 63.12/ft.

W. M. Sharp - P.Eng.

BASIC PLAN: 4,000 LEVEL EXPLORATION-DEVELOPMENT (Continued)

Drive 350' - 6' x 10' Timbered 2-cpt. Raise for Service & Ventilation

			11.7'	per ft.
2. a.	Slash 1 to 6' x 10' (i.e., 4' x 6' slash x 12') and muck 9 cars			
	Labour - 1 miner @ $80.00	$80.00		
	1 motorman 1/2 shift @ $65.	32.50	112.50	9.62
	Supplies			
	Explosives 2/3 x 64.00	42.88		
	Steel " x 5.42	3.63		
	Bits " x 12.44	8.33		
	(Pipe carried with timber)	-	54.84	4.69
	Rental on Alimak (30 days)			12.86
	Mine Services @ 50% x 24.50			12.25
	Overhead @ " x 11.25			5.62
b.	Timber 2 sets, using Alimak, rental included in above:			
	Labour 2 miners @ $80.00	$160.00		
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	Timber, estim. 1,700 hd. ft @ $120/M =	204.00		
	Spikes and hardware @ $5.00	10.00	234.00	20.00
	Mine Services - @ 50% x 24.50			12.25
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	Sub-Total for Slashing and Timbering			$102.14/ft
	TOTAL - 6' x 10' Timbered 2-cpt. Service/Vent. Raise			$165.26/ft

W. M. Sharp P. Eng.