A VALUATION OF THE

BLUE ICE PROPERTY

FOR

CONSOLIDATED SILVER STANDARD

MINES LIMITED

NOVEMBER 1989

Prepared By: Ross Glanville

B.A.Sc.,P.Eng,M.B.A,C.G.A.

Glanville Management Ltd.

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GLANVILLE MANAGEMENT LTD.

November 14, 1989

Mr. R.A. Quartermain
President
Consolidated Silver Standard Mines Limited
Suite 400, 1199 West Hastings Street
Vancouver, B.C.
V6E 3T5
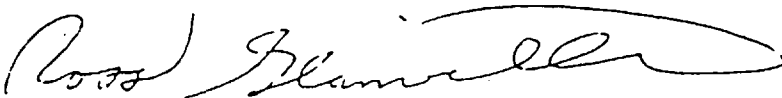
Dear Mr. Quartermain:

Glanville Management Ltd. has determined that the fair market value of the Blue Ice Property is approximately $2.2 million.

I wish to thank you for providing me with information and assistance, and I trust that the attached report meets your requirements.

Yours very truly,

GLANVILLE MANAGEMENT LTD.

Ross Glanville
B.A.Sc.,M.B.A.,C.G.A.,P.Eng.

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EXECUTIVE SUMMARY

Glanville Management Ltd. was commissioned by Mr. R.A. Quartermain to determine the fair market value of the Blue Ice Property. The attached valuation assumes no unusual constraints to the exploration and development of the Property. To be more specific, the Provincial Government restrictions imposed upon the development of the Blue Ice Property due the fact that the claims are located in Wells Gray Provincial Park were assumed to have been eliminated for purposes of this valuation. In December, 1988, the Ministries of Environment, and Mines and Petroleum Resources, announced that exploration in Wells Gray Park would be prohibited and holders of existing mineral tenures would be compensated.

The Blue Ice Property is located in the northwest corner of the Kamloops Mining Division, approximately 50 kilometers west of Valemont, British Columbia. Previous work on the Property included diamond drilling and trenching; however, due to Provincial Government restrictions, no exploration has been carried out since 1973.

Drilling and trenching results in one area of the Property indicated a replacement ore body that appears to be economic on a small scale of operation. Four out of five drill holes in that area interesected significant gold mineralization, with one hole assaying 1.77 ounces per ton over 12.3 feet. Based on the drill results, and estimations as to mining costs, metallurgical recovery, mining dilution, and the gold price, we determined that the present value of only a portion of the replacement zone is approximately $1.5

million. However, there are a variety of factors which indicate that the value of the whole property is substantially greater. These include the following:

1. Other comparable zones are expected to be found along the unexplored limestone band.

2. For the cash flow calculations we utilized less than half of the ore indicated or inferred by the diamond drill holes, since we only assumed a small open pit mining operation of the known replacement zone.

3. Reserves are still open, and one could expect extensions along strike and at depth (where ore could be extracted via an adit or decline).

4. The widespread stockwork quartz veining is auriferous, and covers an extensive area of the property, indicating the potential for a larger open pit deposit.

5. The quartz vein on the Caribou claim is gold bearing.

Based on the foregoing, it is my opinion that the value of the whole Blue Ice Property is 50% greater than the value of the replacement zone itself. Consequently, the total value of the Blue Ice Property would be approximately $2.2 million. Such a value also appears in line with what the "market" is paying for gold ounces in the ground, as discussed on page 20.

INTRODUCTION AND TERMS OF REFERENCE

Glanville Management Ltd. was commissioned by Mr. Robert Quartermain, President of Consolidated Silver Standard Mines Limited, to determine the fair market value of the Blue Ice Property. In order to accomplish this assignment, the author reviewed a variety of reports and documents as outlined below, and met with Mr. Quartermain and Mr. Al Potter, who have both been on the property.

Reports and Documents Reviewed

1. Annual Report, Minister of Mines, 1938, Part "D".

2. Letter from Mr. A. Langley·to Mr. W.C. Douglass, General Manager of Kelowna Exploration Co., describing the Blue Ice Property, January 23, 1940.

3. Anglo-Huronian diamond drill hole results and maps.

4. Summary Report on the Blue Ice Property by A.G. Langley, M. Inst. M.M., August 12, 1938.

5. Report on Blue Ice, Caribou, and Future Price Mineral Claims by R. Fearnly, September 19, 1953.

6. Report on the Blue Ice Group by J.H. Hachey, March 15, 1968.

7. Report on the Blue Ice Property by R.A. Quartermain, May, 1986.

8. Correspondence between the Provinical Government and Consolidated Silver Standard.

VALUATION METHODOLOGIES

Appendix II provides an introduction to valuation theory and a description of valuation methods that have been utilized in the past. Following are brief descriptions of the methods that can be applied to determine a value for the Blue Ice Property.

Discounted Cash Flow Method

If cash flows can be estimated with some degree of certainty, the discounted cash flow method is the preferred one. In this case, I have utilized the discounted cash flow method to determine a value for the replacement zone (in the immediate area of diamond drill holes #1 to #5 inclusive).

The discounted cash flow method accounts for all cash inflows (revenues) and outflows (expenses) such as operating costs and capital costs. It also accounts for risk, inflation, and the cost of money (interest). The discounted cash flow method is forward looking (that is, past expenditures are irrelevant) and is commonly utilized for valuing mining properties.

Adjusted Discounted Cash Flow Method

For reserves that are inferred or projected, one can use a combination of the discounted cash flow method and a probability application. This probability is based on a judgement of the likelihood of achieving the projected reserves and proceeding to production according to an estimated timetable and cost schedule.

Parts of some of the above reports have been incorpor-
ated in the attached valuation report.

A field examination of the property was not made at this
time since the reports that I reviewed were prepared by
professional engineers or geologists who have examined the
property. The most pertinent information comes from drill-
ing, trenching, prospecting and mapping. In any case, this
report is not a technical report, but rather a valuation
document.

The report has been prepared for the purpose of estab-
lishing a value of the Blue Ice Property, and is based on
results of actual work performed on the property and on
information that was assembled at the time of preparation.
While all care has been taken with the compilation of this
report, Glanville Management Ltd. hereby disclaims any and
all liability arising out of its use or circulation.

lars Per Ounce of Reserves

Many brokers and analysts estimate the value of a gold deposit by multiplying the ore reserves in ounces of gold by a "dollars per ounce of reserves" factor established from market transactions.
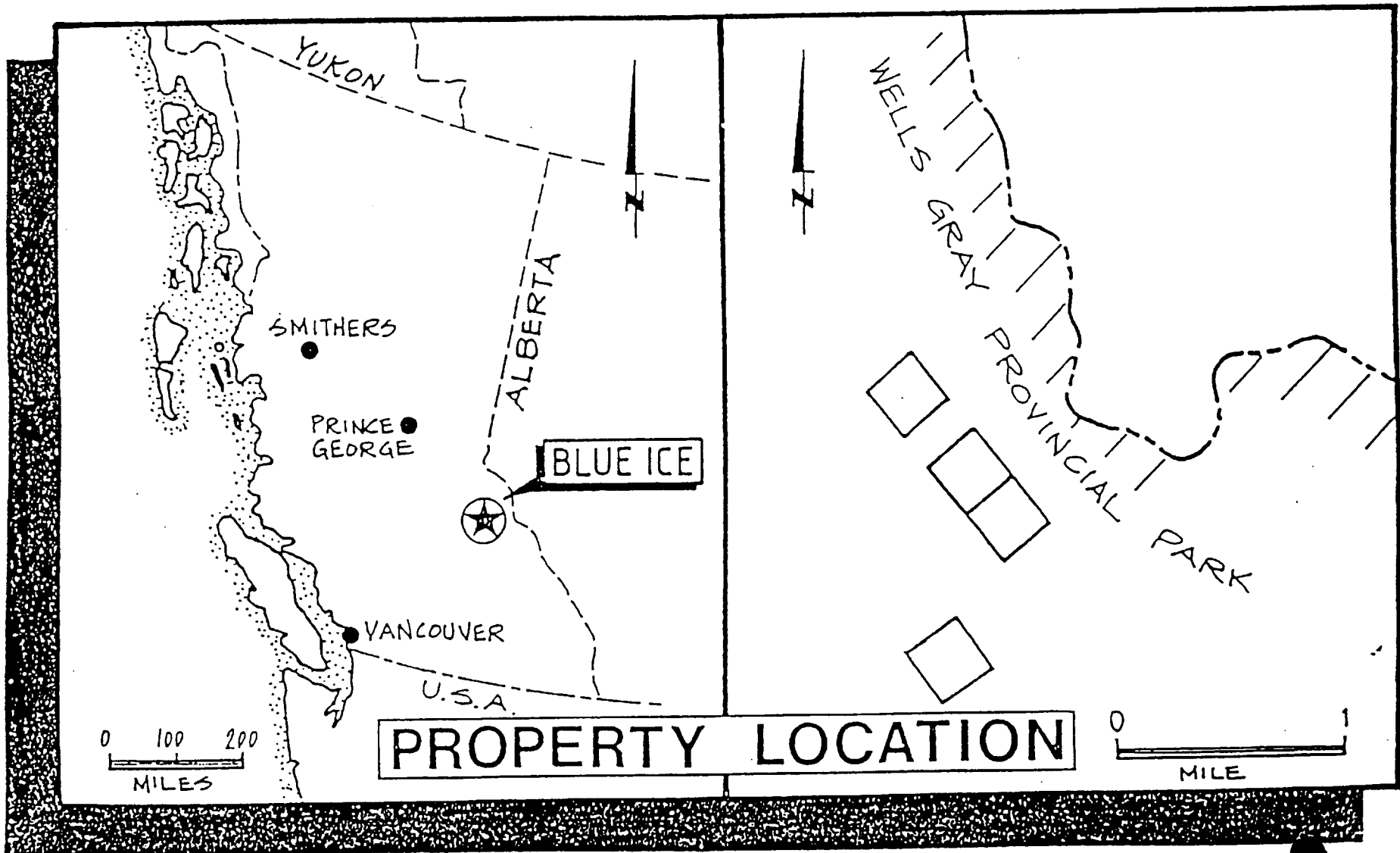
Market Capitalization

The market capitalization of a Company with one major property can give an indication of the value of that property.

PROPERTY LOCATION/ACCESS

The Blue Ice Property is located in the northwest corner of the Kamloops Mining Division, in a mountainous region at the headwaters of Hobson Creek and of Azure and Raush Rivers (see attached property location map and Figure 1 from the 1938 Report of the Minister of Mines). Drainage from the area is south into Clearwater Lake, which is drained by the Clearwater River into the North Thompson River. Drainage to the north is by the Raush River which flows into the Fraser River near McBride, some 65 kilometers away. The headwaters of the North Thompson River lie a few miles to the east.

There are three natural routes into the area. One route is by way of the North Thompson River, from Gosnell on the Canadian National Railway, a distance of 70 kilometers. A second route is 25 kilometers by trail up Hobson Creek from the head of Hobson Lake. A third route is up the valley of the Raush River to its headwaters, a distance of about 80 kilometers.

The property is readily accessible by helicopter from Valemont, 50 kilometers to the east. The closest logging road terminates 20 kilometers southeast of the property.

YUKON

ALBERTA

SMITHERS

PRINCE GEORGE

BLUE ICE

VANCOUVER

U.S.A.

0   100   200
MILES

WELLS GRAY PROVINCIAL PARK

PROPERTY LOCATION

0   1
MILE

TOPOGRAPHY/CLIMATE

The area lies amongst high, glacier-capped mountains which rise to elevations in excess of 8,000 feet. Few peaks in the general vicinity exceed 9,000 feet in elevation, but some rugged summits north of Rausch Glacier and at the head of the North Thmpson River may be considerably higher. All of the higher peaks and most of the more prominent ridges bear glaciers which, as on the north part of the area and a few miles to the south, may coalesce to form extensive ice-fields.

The climate is one of heavy precipitation. Timber-line proper is at an elevation of 6,000 feet. The growth includes balsam, fir, and spruce, in sizable stands locally to elevations in excess of 5,000 feet. Brush is not excessively thick in the upper parts of the valley.

CLAIM STATUS/OWNERSHIP/AGREEMENTS

Consolidated Silver Standard Mines Limited holds 4 claims covering the main showings of the Blue Ice Property, as follows:

Mineral Claims	Record No.
(see attached map)	
Blue Ice No. 1	13318
Caribou No. 1	13319
Future Price No. 1	13320
Future Price No. 2	13321

Silver Standard Mines Ltd. (N.P.L.) acquired a 25% interest in the four claims in 1957, with the right to increase that interest to 75% by expending an additional $15,000 on exploration. Ownership of the claims was transferred to Silver Standard Mines Ltd. (N.P.L.) on September 2, 1970. On June 21, 1985, the claims were registered in the Company's new name, Consolidated Silver Standard Mines Limited.

HISTORY

Fred Wells staked a part of what is now the Blue Ice group in 1923, but did not return, and other stakings were known in this locality in the same year. Several engineers reported on the various holdings in 1926 and 1927, and in 1928 Joseph Errington of Toronto optioned all stakings in the area. Under the direction of his bother, W. Errington, a pack-trail was built from the Raush Valley near McBride on the Canadian National Railway, up Raush River to Azure River, a distance of approximately 80 kilometers. A trail was built to the Blue Ice, and a main camp was built at Azure River crossing. The options were relinquished in 1931 and the Raush River trail was abandoned. In 1933, Albreda Holding Company, Limited, a private company with head office in Vancouver, acquired the Blue Ice and War Colt groups, but apparently little work was done and the groups were allowed to lapse.

The Blue Ice Group, subsequently owned by W.R. Johnson and Associates of Blue River, was relocated in 1938 and, as the result of an examination by A.G. Langley of Vancouver, the Group was optioned to Anglo-Huronian, Limited. A trail

LEGEND

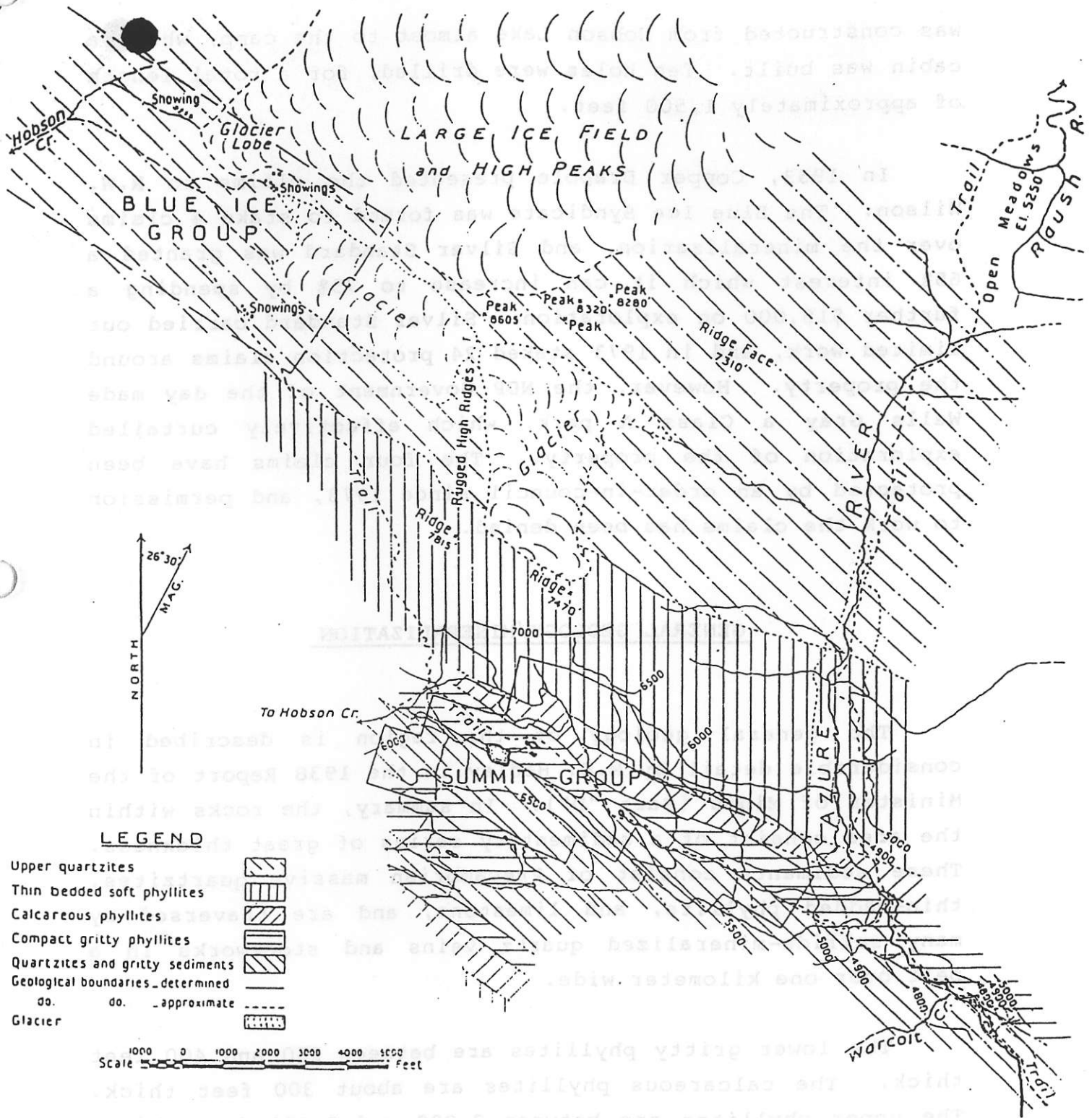| Upper quartzites |
| Thin bedded soft phyllites |
| Calcareous phyllites |
| Compact gritty phyllites |
| Quartzites and gritty sediments |
| Geological boundaries_determined |
| do.   do.   _approximate |
| Glacier |

Scale

Fig. 1. Sketch-map of country at headwaters of Hobson Creek, Azure River, and Raush River.

Minister of Mines, 1938, Part "D"

was constructed from Hobson Lake almost to the camp, where a cabin was built. Ten holes were drilled, for a total length of approximately 1,500 feet.
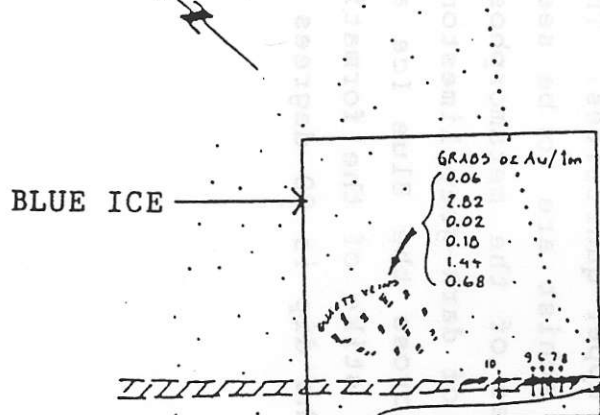
In 1953, Copper Drabble presented the claims to R.W. Wilson. The Blue Ice Syndicate was formed to stake 4 claims over the mineralization, and Silver Standard was granted a 65% interest which it can increase to 75% by spending a further $15,000 on exploration. Silver Standard carried out limited work, and in 1973 staked 24 protection claims around the property. However, the NDP Government of the day made Wells Gray a Class A park, which effectively curtailed exploration of the property. The four claims have been protected by an order-in-council since 1973, and permission to work the claims has been denied.

GENERAL GEOLOGY/MINERALIZATION

The general geology of the region is described in considerable detail by M.S. Hedley in the 1938 Report of the Minister of Mines (Part "D"). In summary, the rocks within the area consist of a sedimentary series of great thickness. These sediments consist of Precambrian massive quartzites, thin-bedded phyllite, and limestone, and are traversed by many sulfide-mineralized quartz veins and stockworks in a belt over one kilometer wide.
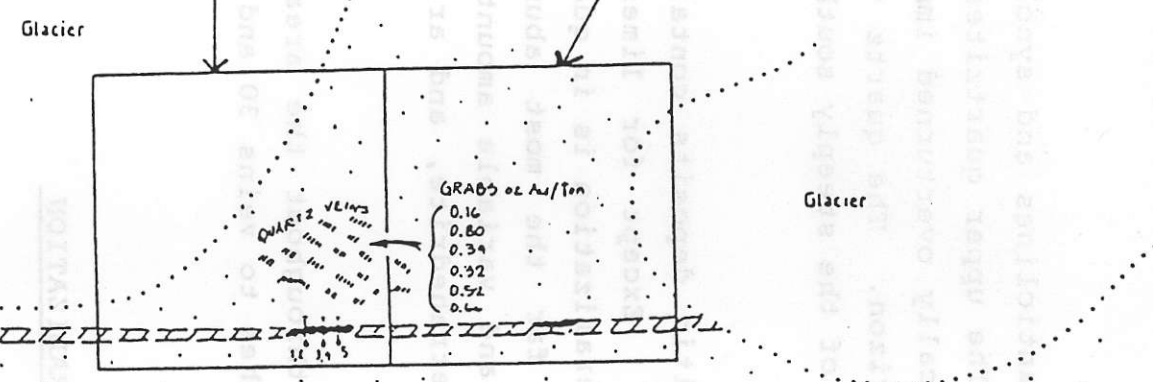
The lower gritty phyllites are between 250 and 400 feet thick. The calcareous phyllites are about 300 feet thick. The upper phyllites are between 2,000 and 3,000 feet thick. The upper quartzites are in the neighbourhood of 5,000 feet thick. The uppermost phyllites are at least 1,000 feet thick. The rocks have a regional strike of north 60 degrees

CONSOLIDATED SILVER STANDARD MINES LTD.
BLUE ICE PROPERTY

FUTURE PRICE #1   FUTURE PRICE #2

Glacier

BLUE ICE →

GRABS oz Au/Ton
0.06
2.82
0.02
0.18
1.44
0.68

QUARTZ VEINS

Glacier

GRABS oz Au/Ton
0.16
0.80
0.34
0.32
0.52
0.66

D.D.H.	INCLIN.	oz Au/Ton	FEET
6	-50	0.21	7
7	-50	0.25	3
8	-55	0.04	3
9	-42	0.16	5
10	-35	0.12	5

D.D.H.	INCLIN.	oz Au/Ton	FEET
1	-42	Tr	–
2	-60	0.35	5
		0.70	5
		0.18	5
3	-45	1.55	15
4	-60	CAVED	–
5	-55	0.05	39

CARIBOU

QUARTZ VEIN

LEGEND

▨	Limestone
⠿	Quartzites
▥	Phyllites
/////////	Quartz veins
▬	Sulphides
•—	Drill Hole

0   1000   2000

FEET

YUKON

SMITHERS
PRINCE GEORGE
ALBERTA
BLUE ICE
VANCOUVER
U.S.A.

WELLS GRAY PROVINCIAL PARK

PROPERTY LOCATION
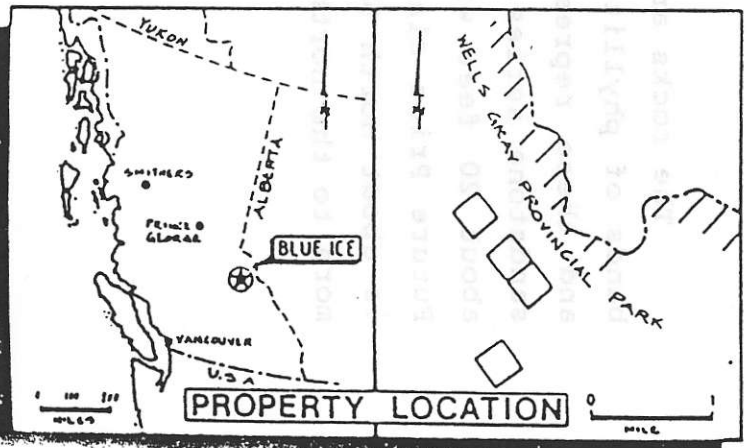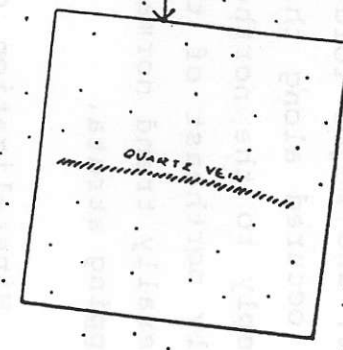
west, and major folding into broad anticlines and synclines
has occured along this direction. The upper quartzites dip
steeply to the northeast and are locally overturned immedi-
ately northeast of the Blue Ice horizon. The quartz veins
generally trend normal to the strike of the steeply southwest
-dipping strata.

Mineralization consists of pyritic deposits containing
gold and small amounts of silver. Except for limestone
replacement on the Blue Ice, all mineralization is in quartz-
filled fractures. Pyrite is by far the most abundant
mineral, but there are also small and variable amounts of
galena, sphalerite, chalcopyrite, tetrahedrite, and arseno-
pyrite.

Quartz veins are very common throughout the area and
range in size from stringers and gashes to veins 30 and more
feet wide.

PROPERTY GEOLOGY/MINERALIZATION

The rocks are all members of the upper quartzites. Thin
bands of phyllite or quartz-sericite schist are to be seen,
and these represent more silty phases of the metamorphosed
sandstone series. There is one band of dark-grey limestone,
about 20 feet wide, which extends across the Blue Ice and
Future Price claims and beyond. The stike of the formation
is about north 55 degrees west and the dip is 80 degrees or
more to the northeast.

● There are three major areas of mineralization on the Blue Ice Property, as follows:

1. Quartz Vein

The quartz vein, on the Caribou claim, is well exposed for over 600 feet to an elevation of 6,400 feet, along a line trending a little west of north. At the upper end, the vein is 6 to 8 feet wide and, for the remainder of its length, is 4 to 5 feet wide with local enlargements to 15 feet.

Mineralization consists of pyrite with chalcopyrite and small amounts of galena and sphalerite (chiefly at the upper end of the exposure). Mineralization is restricted to the uppermost 200 feet and to the lowermost end of the exposure. The greater part of the vein is barren. Three selected samples were taken at the upper end, with results as follows:

(1) From upper open-cut: Gold, 0.62 oz per ton; silver, 2.4 oz. per ton.

(2) From second open-cut, fine pyrite: Gold, 2.90 oz. per ton; silver, 0.3 oz. per ton.

(3) Almost solid sulphide, including a little chalcopyrite and galena: Gold, 0.60 oz. per ton; silver, 7.0 oz. per ton; copper, 2.1 per cent.

2. Limestone Band

This limestone band strikes across the other three claims (Blue Ice, Future Price #1, Future Price #2), and to date mineralization has been found in two localities. A section of the limestone band on the Future Price #1

claim is heavily mineralized with pyrite, forming a replacement body of considerable size. A sample was channelled in sections across a width of 18 feet, with results as follows:

(1) Five feet from the northeast wall, nearly solid pyrite: Gold, 0.74 oz. per ton; silver, 0.3 oz. per ton.

(2) Next 5 feet, 75 per cent pyrite: Gold, 0.16 oz. per ton; silver, trace.

(3) Next five feet, 75 per cent pyrite: Gold, 0.24 oz. per ton; silver, 0.6 oz. per ton.

Other samples were taken southeast of this line:

(1) Ten feet southeast, almost solid fine pyrite near foot-wall, 2 feet wide: Gold, 1.96 oz. per ton; silver, trace.

(2) Thirty feet southeast, almost solid coarse pyrite near centre, selected: Gold, 0.62 oz. per ton; silver, 0.4 oz. per ton.

(3) Forty feet southeast, 5-foot channel to 1 foot from foot-wall, average section: Gold, 0.28 oz. per ton; silver, 0.3 oz. per ton.

3. Stockwork Quartz Veining

To the east of the limestone band is a large area of gold-bearing, sulphide-rich stockwork quartz veining. At the most northerly exposure, at the claim posts on the Blue Ice Claim, 6,000 feet elevation, is a knoll of quartzite surrounded by moraine (see Figure 3* from the

* Since 1938, when Figure 3 was prepared, the glacier has receeded almost 500 feet.

1938 Report of the Minister of Mines). The minerali-
zation was mapped, as exposed, in considerable detail in
1938, although the full complexity is not reproduced in
Figure 3. On the plan the chief concentrations of pyrite
in quartz are indicated. The full extent of this complex
of quartz veining is not known.

As shown in the plan, the total exposed length is 460
feet and the greatest width 120 feet; individual widths
of quartz are as great as 20 feet. One prominent direc-
tion of fissuring is north 55 degrees west, parallel to
the formation, another trends about north 30 degrees
west, and a third north 15 degrees east; the dip in all
is very steep. Quartz parallel to the bedding is mostly
barren; that diverging 25 degrees from it is poorly
mineralized. Pyrite is found to occur commonly in short
quartz veins and lenses, and within the larger quartz-
bodies as lenses of veins.

Three of the better mineralized samles have been repro-
duced below:

> (1) Almost solid pyrite: Gold, 2.82 oz. per ton;
>   silver, 1.8 oz. per ton.
> (2) Pyrite stringer in schist: Gold, 1.44 oz. per
>   ton; silver, 1.6 oz. per ton.
> (3) Pyrite mass in schist: Gold, 0.68 oz. per ton;
>   silver, 0.5 oz. per ton.

Another area of quartz-veining with local pyrite lies
some 2,000 feet to the southeast (on the Future Price
claims) at elevations beween 6,600 and 7,000 feet. The
veining there is more widely spaced, the generalized
pattern of which is shown in the upper part of Fig. 3.
Widths of quartz are extremely variable over lengths up

ZONE № 2.

Quartz-Pyrite
Veins.

Overburden

Boulders
of Ore

Creek

J.D. Holes.

Glacier

Limestone Band
Projected.

Assays From
ZONE №2.
Au
0.06
2.82
0.02
0.18
1.44
0.58

11500 N

10500 N

9500 N

(See also M/M Report 1938.)

Assays from Quartz-
Pyrite Veins. №3 Zone.
Oz per ton.
Au
0.16
0.80
0.34
0.32
0.52
0.66

ZONE №3.

ZONE № 1.
Pyrite replacement

D.D.
Holes

Limestone Band

Ice
Flow

100 E

8100 E

8900 E

9900 E

to 200 to 300 feet. Pyrite mineralization is locally almost solid in some veins, over widths from a few inches to several feet and for lengths of a few tens of feet at the most. Samples of well-mineralized quartz include:

(1) Across 10 inches of a well-mineralized vein: Gold, 0.80 oz. per ton; silver, 0.4 oz. per ton.

(2) Across 13 inches of a strongly-mineralized vein: Gold, 0.34 oz. per ton; silver, 2.1 oz. per ton.

(3) Quartz containing 60 per cent pyrite, 200 feet northwest of posts; Gold, 0.32 oz. per ton; silver, 2.1 oz. per ton.

(4) Across 24-inch vein, 80 per cent pyrite, 200 feet east of posts: Gold, 0.52 oz. per ton; silver, 0.3 oz. per ton.

(5) Quartz with 60 per cent pyrite, from north 60 degrees east vein, east of posts: Gold, 0.66 oz. per ton; silver, 4.5 oz. per ton.

DRILL RESULTS

The results of the 10 holes drilled by Anglo-Huronian are summarized below:

Holes #1 through #5 (see attached plan produced by Anglo-Huronian) were drilled through the limestone band on the Future Price #1 claim; and the results are summarized below:

Hole #	GOLD GRADE (ounces per ton)
Hole #1	Trace
Hole #2	15' of 0.41 (including 10' of 0.53)
Hole #3	12.3' if 1.77
Hole #4	5' of 0.18
Hole #5	44' of .05

Holes #1 and #2 were drilled from one location, approximately eighty feet northwest of holes #3 and #4 (which were also drilled from one location). Hole #5 was drilled approximately 70 feet southeast of holes #3 and #4.

Holes #6 through #10 (see attached plan reproduced from Anglo-Huronian) were drilled through the limestone band on the Blue Ice claim; and the results are summarized below:

Hole #	GOLD GRADE (ounces per ton)
Hole #6	8' of 0.27
Hole #7	2' of 0.40
Hole #8	6' of 0.04
Hole #9	7' of 0.16
Hole #10	6' of 0.12

Holes #6, 7, 8, and 9 were drilled approximately 50 feet apart, while hole #10 was drilled about 175 feet from hole #9.

EXPLORATION POTENTIAL

There is good exploration potential in several different areas of the Blue Ice Property. Additional replacement zones may be discovered along the limestone band, or the massive sulfide on the Future Price #2 claim may joint at depth with the massive sulfides on the Blue Ice claim along the same horizon. In the 1938 Report of the Minister of Mines the following quote supports this possibility:

"It is reported that beneath the present glacier front there were workings in past years, but that a recent advance of the ice has covered these. The work was done,

BLUE ICE.
ZONE No 2.

Moraine

No 2 Zone
Quartz-Pyrite
Veins
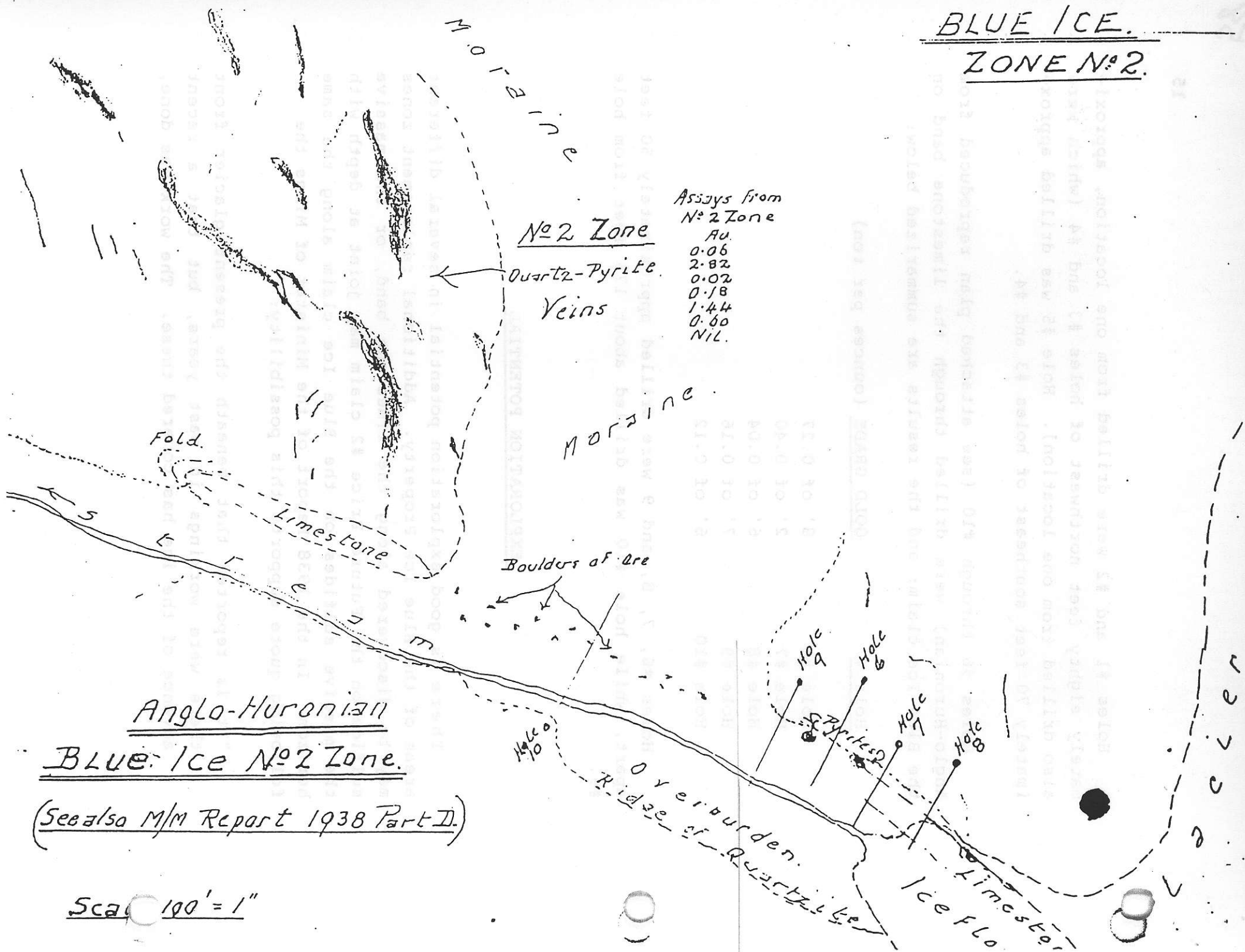
Assays from
No 2 Zone
Au.
0.06
2.82
0.02
0.18
1.44
0.60
Nil.

Fold.

Limestone

Moraine

Boulders of Ore

Anglo-Huronian
Blue Ice No 2 Zone.

(See also M/M Report 1938 Part II.)

Scale 100' = 1"

Hole 9   Hole 6
Pyrite
Hole 10   Hole 7
Hole 8

Overburden.
Ridge of Quartzite

Limestone
Ice Flo

Glacier

it is said, on cross-leads. There is evidence of this
being so, but there was in 1938 no possibility of climb-
ing beneath the ice. In addition to quartz veins there
exists strong evidence of there being a replacement-body
beneath the ice in the presence of considerable float in
the moraine north-west of the glacier-stream discharge.
Small blocks and boulders to half a ton in weight are to
be seen, and it is not at all likely that this float came
from the body described above."

The large area of gold-bearing, sulfide-rich stockwork
quartz veining to the east of the limestone belt might lead
to a low-grade bulk tonnage open-pit. Chip and grab samples
over a large area resulted in good gold assays, with many
ranging from 0.25 ounces per ton to over 1.00 ounce per ton.

VALUATION DETAILS FOR REPLACEMENT ZONE

The replacement zone has been drilled over a length of
150 feet, with four out of five holes intersecting substan-
tial gold as follows:

        10.0 feet of 0.53 ounces per ton
        12.3 feet of 1.77 ounces per ton
         5.0 feet of 0.18 ounces per ton
         5.0 feet of 0.15 ounces per ton (estimated, based on
                                           44 feet of .05)

The weighted average grade and width of the above inter-
sections is 0.89 ounces per ton and 8.1 feet, respectively.
Allowing, for the angle of intersection, the weighted average
true thickness would be 6.0 feet.

The actual mining grades and thickness that were assumed are provided in the following section.

ASSUMPTIONS

1. Approximately 60% of the zone is ore (compared to 80%, based on 4 out of 5 diamond drill holes).

2. Average grade of the in-place ore is 0.85 ounces per ton (compared to the 0.89 ounces per ton calculated above).

3. Average width is 6 feet.

4. The zone extends beyond the diamond drill holes one half of the distance between drill holes. As a result, the total length would be 225 feet.

5. The zone extends to depth beyond the deepest drill hole for a distance of one half of the distance from surface to the deepest drill hole. As a result the depth is assumed to average 225 feet.

6. Density of 10 cubic feet per ton of ore.

7. Mining dilution of 20% at one quarter the average grade.

CALCULATIONS OF MINERAL INVENTORY

1. In-Place Tons:

$$\frac{225' \times 225' \times 6'}{10} \times 60\% \text{ ore} = 18,225 \text{ tons}$$

2. Mineable Tons: 1.20 x 18,225 = 21,870 tons

3. Mineable Grade: 18,225 x 0.85 = 15,491
                    3,645 x 0.21 =   775
                   21,870 x 0.74 = 16,266

   Mineable Grade = 0.74 ounces/ton

POSSIBLE MINING METHODS

There are several approaches which could be taken to mine the ore zone, or zones, depending upon the amount and location of reserves proven up by additional drilling. Some of these are as follows:

1. Open pit mining down to say 100 or 150 feet.

2. Slot mining (mining the narrow ore "slot" with an excavator with a long reach).

3. A combination of open pit mining and slot mining.

4. Underground mining via an adit or decline.

APPLICATION OF VALUATION METHODS

The two methods that have been used to value the replacement zone are the "Discounted Cash Flow" and the "Dollars Per Ounce of Reserve".

CASH FLOW

The approximate economics of a combination of open pit mining and slot mining would be as follows:

- Strip ratio down to 125' of approximately 20:1 (waste/ore).

- Mining costs of approximately $3.00 per ton.

> This $3.00 per ton number is based on a comparison
> with costs from other operations, a discussion
> with other mining engineers, and my own experience
> as Vice-President of Wright Engineers Ltd.
> Contract mining costs for the small open pit
> operation at the Samatosum Mine (40 kilometers
> from Barriere, B.C.), for example, are approxi-
> mately $2.20 per ton mined. However, because of
> the more remote location of the Blue Ice property,
> I believe that a $3.00 per ton figure is more
> reasonable for the Blue Ice property. In any
> case, the total mining costs of $63 per ton (with
> a 20:1 strip ratio) are comparable to those
> achievable by underground mining.

- Processing and administrative costs of $50 per ton

> Although $50 per ton may appear to be a relatively
> high milling and administrative cost, I have
> assumed a relatively small mobile mill.

- Tons processed

> = $\frac{125}{225}$ x 21,870 tons (tons down to 225 feet) = 12,500

- Ounces produced (at 90% recovery)

> = 0.74 x 12,150 x 90% = 8,090

- Revenue at $475 Canadian (approximately $400 US)

> = $3,843,000

- Costs:

    Mining: $3.00/ton x 21 (20:1 strip ratio) = $ 63/ton
    Processing and Administration   =   50/ton
                                        Total = $113/ton

    Total Operating Costs: $113 x 12,150 = $1,373,000

- Operating margin

    = $2,470,000 ($3,843,000 - $1,373,000)

- Capital costs (including road access, camp, office, mobilization and demobilization) of $1,000,000

- Net profit of $1,470,000 ($2,470,000 - $1,000,000)

DOLLARS PER OUNCE OF RESERVES

Based on the indicated reserves in the replacement zone, the contained ounces of gold would be as follows:

    21,870 tons at 0.74 ounces per ton = 16,180 ounces

Utilizing a factor of US $75* per ounce of reserves, the valuation of the Blue Ice Property would be:

$$\frac{\$75 \times 16,180}{.85} = \$1,428,000$$

MARKET CAPITALIZATION

If the Blue Ice property was the only asset of a publicly traded company, it is my opinion that the market capitlization of that company would be greater than two

* See Appendix III for supporting documentation.

million dollars ($2,000,000) if there were no unusual restrictions to exploration, development, and mining of the property. Exploration results to date are very good and the exploration potential of the Blue Ice property is excellent.

VALUATION SUMMARY

Based on the foregoing, it is my opinion that the value of the replacement zone of the Blue Ice Property is approximately $1.5 million. However, there are a variety of factors which indicate that the value of the whole property is substantially greater. These include the following:

1. For the cash flow calculations, I used just over 40% of the ore indicated by the drill holes:

$$\left(\frac{60\% \text{ of zone assumed to be ore}}{80\% \text{ of zone indicated to be ore}} \times \frac{125 \text{ foot depth}}{225 \text{ feet indicated}} \right) \approx 42\%$$

2. As gold is widespread, other comparable zones are expected to be found, thus dramatically increasing the profitability, since most of the fixed costs would have already been incurred. For example, drilling in the limestone band on the Blue Ice claim indicated grades from 0.12 to 0.40 ounces per ton over widths of 2' to 10' for a stike length of approximately 300 feet. Although probably not economic in itself, it indicates the potential of the claims for additional gold mineralization.

3. Reserves are expected at depth and along strike, resulting in substantially more ore that could be economically accessed by underground mining.

The following quotes from A. Langley, Consulting Mining Engineer, in January, 1940, support this contention:

> "The surface showing at the Blue Ice is most impressive and it is hard to realize that massive sulphide ore of this type, similar to that of the Island Mountain Mine, should not go down."

> "Possibilities for a similar orebody under the glacier are indicated by the presence of numerous boulders of massive pyrite lying in the bed of the creek just below the toe of the ice, one of which measured 45" x 42" x 32". A sample chipped from this boulder ran: Gold 1.27 ounces per ton and silver 18.22 ounces per ton."

> "Ore could be transported by aerial tram to a mill site on Hobson Creek, some 2,000 feet below the workings."

4. The widespread stockwork quartz veining covers a large area of the property and may have the potential for an open pit deposit.

Based on the foregoing, it is my opinion that the value of the whole Blue Ice Property is at least 50% greater than the value of the replacement zone itself. Consequently, the total value of the Blue Ice Property would be approximately $2.2 million.

APPENDIX I

CERTIFICATE OF ROSS GLANVILLE

CERTIFICATE OF QUALIFICATION

I, Ross O. Glanville, of 7415 Pandora Drive, Burnaby, British Columbia, Canada, hereby certify that:

(1) I am a B.A.Sc. (Mining Engineering) graduate from the University of British Columbia (1970).

(2) I hold a Masters Degree in Business Administration (M.B.A.) from the University of British Columbia (1974).

(3) I am a registered member of the Association of Professional Engineers of British Columbia, and have been since 1972.

(4) I am a registered member of the Certified General Accountants Association of British Columbia.

(5) I am President of Glanville Management Ltd., a company specializing in the valuations of exploration properties and mining companies.

(6) I have been practising my mining engineering profession since 1970 and have valued exploration and mining properties in many parts of Canada and the U.S.A., as well as in other areas of the world.

(7) I was formerly President of Giant Bay Resources Ltd. and Vice President – Valuations of Wright Engineers Limited, a large international mining, engineering, and consulting company. Prior to that I was a mining engineer and transportation manager with Placer Development Ltd., and a mining and project analyst with two major investment holding companies.

(8) My report is based on information provided to me by Consolidated Silver Standard Mines Limited personnel, as well as discussions with the professional engineers and geologists familiar with the property. As stated in the terms of reference, I have not visited the property.

(9) I have no interest, nor do I expect to receive any interest, either directly or indirectly, in Consolidated Silver Standard Mines Limited.

(10) I herewith grant my permission for Consolidated Silver Standard Mines Limited to use this report for whatever purpose they deem necessary.

DATED in Vancouver, British Columbia, on the 14th day of November, 1989.

R.O. Glanville,B.A.Sc.,P.Eng.,M.B.A.,C.G.A

APPENDIX II

VALUATION METHODOLOGIES

APPENDIX II

VALUATION METHODOLOGIES

This section provides an introduction to valuation theory and a description of valuation methods used in the past.

INTRODUCTION

There are a variety of appropriate methods for valuing mineral properties depending upon the stage, or status, of the property from initial exploration through to production. Some of these stages are outlined below:

1) Hypothetical analysis
2) Regional program
3) Anomalies
4) Claims staked (based on anomaly)
5) Claims staked (based on "hot" area)
6) Additional geological, geochemical or geophysical data
7) Development of a model for a target deposit
8) One drill hole in a mineralized zone
9) Two drill holes in a mineralized zone
10) Three drill holes to define a plane of mineralization
11) Additional drill holes for establishing inferred reserves
12) Preliminary feasibility study
13) Enough holes to define proven, probable and possible ore
14) Exploratory development
15) Feasibility study
16) Construction of mine/mill
17) Producing mine

Some of the factors that affect the valuation of mining properties, especially at the earlier stages are:

1) Local geological controls (faults, contacts, etc.)
2) Exploration and/or mining history of the area
3) General mining activity in the area
4) Comparison to similar geological settings elsewhere in the world

5) The "track record" of the exploration geologists
6) Presence of valuable minerals or metals (in situ, stockpiles, dumps, tailings, etc.)
7) Proximity to known reserves
8) Staked, leased, or freehold claims
9) Infrastructure in place
10) Remoteness
11) Environmental sensitivities
12) Projected metal prices
13) General economic and political climate
14) Specific interests of a party bidding for the property

VALUATION METHODS USED IN THE PAST

A listing of the valuation methods, followed by brief descriptions of the methods that have been used in the past, is provided below:

1) Net present value (NPV) or discounted cash flow (DCF) method
2) The DCF method applied to a target or model deposit with the resulting value reduced by a factor to reflect the probability of achieving the target
3) Committed future expenditures by optionee plus the additional expenditures required to earn an interest times a probability of making the non-committed expenditure
4) Premium or discount on historical costs
5) Historical costs plus prudent expenditures for the next phase of work
6) Prices paid for comparable properties
7) Share price history
8) Market premium to, or discount from, share price
9) Book value per financial statements
10) Price/earnings ratio
11) Price/cash flow ratio
12) Statistical or probabilistic method
13) Replacement value of mine/mill complex
14) Value per ton of ore in the ground
15) Payback period

1) **Net Present Value (NPV) or Discounted Cash Flow (DCF)**

If cash flows can be estimated or projected with some degree of certainty, the DCF method is the preferred one. Such cash flows are then discounted at an appropriate rate (considering the risk factors) to obtain a net present value.

Some of the requirements, or inputs, for the valuation of a mining property via the DCF approach are: Geology and Mineral Inventory; Mineable Ore Reserves (mining dilution); Mining Method; Metallurgy-Research; Metallurgy-Design (metallurgical recovery); Ancillary Services; Capital Costs; Operating Costs; Marketing; Rights, Ownership; Environmental Impact; Socio-Economic Impact; and Financial Analysis.

The DCF Method accounts for all cash inflows (or revenue) and outflows (or expenses) such as capital costs, operating costs and income taxes. It also accounts for risk, inflation and the cost of money (interest). The DCF method is forward looking (that is, past expenditures are irrelevant) and is general in application.

2) **DCF Adjust to Reflect the Probability of Success**

For properties at a sufficiently advanced stage such that grade and tonnage can be estimated or projected, one can use a combination of the discounted cash flow method and a probability application. This probability is based on a judgement of the likelihood of achieving a certain grade and tonnage, and, in addition, the chance and timing of proceeding to development.

3) **Committed Future Expenditures by Optionee**

One can determine the committed future expenditures by an optionee plus the additional expenditures required to earn an interest in the property times a probability of the non-committed expenditures being made. These expenditures should be further reduced by a discount rate to reflect the timing of the expenditures. One can then calculate the value ascribed to the optionor's remaining interest in the property.

4) Premium or Discount on Historical Costs

This method implies a property is worth what has been spent on it (sometimes adjusted to present day dollars by an inflation index), plus a premium if the results are good, or a discount if the results are poor. However, expenditures on a property are not necessarily indicative of value, and a premium or discount is a subjective factor. Neverthless, there is some correlation between costs and results.

5) Historical Costs plus Prudent Budgetted Expenditures

This method simply utilizes past costs and adds the budgeted costs of the next phase of the work. As stated in "4" above, costs are not necessarily a good indicator of value. In addition, adding the costs of the next phase of work ignores the fact that expenditures have to be made (that is, an outlay of cash, which is a negative factor) in order to generate the value. Presumably, though, one budgets future expenditures on the expectation that the expended dollars will add at least that much in value. However, in order for this method to work, the added value has to be twice the budgeted expenditures for the next phase of the work. Although this is possible, the added value could just as easily be less than the expenditures or many times the expenditures.

6) Comparable Properties

This method has been used to establish a value based on a known transaction price of a comparable orebody. In mining, unlike oil and gas, there are no true comparables. Each property is relatively unique with regard to geology, costs, infrastructure, and some of the other factors mentioned earlier. However, transaction prices of similar properties can indicate a range of value for a particular property.

7) Share Price History

This method can give an indication of value, but is only applicable if the shares are listed on a public exchange, and if the company's only major asset is the property to be valued. In addition, the price of a few shares sold is not necessarily reflective of what you could sell all the share for.

8) **Market Premium or Discount on Share Price**

This method applies a premium or discount to a market price of a share. The method is subjective, but historical premiums and discounts (based on acquisitions) can be used as a guide to value.

9) **Book Value**

For exploration companies that capitalize exploration costs until a production or abandonment decision, this method is of little value. You may have unwisely spent exploration dollars, yet they appear on your books as assets. Conversely, you may have spent very few dollars, but have a very valuable orebody.

10) **Price/Earnings Multiple**

This method estimates earnings, which are multiplied by a price/earnings (P/E) multiple. The method is useful for a producing mine or company but is not as good as the discounted cash flow approach. Book items such as amortization and depreciation, which do not affect cash flow, can produce unrealistic values.

11) **Price/Cash Flow Ratio**

This method estimates cash flows which are then multiplied by a price/cash flow multiple typical of the mining industry. Although this method is acceptable for operating mines, it is not of much value for developing mines where the construction capital has not yet been spent.

12) **Statistical or Probabilistic Method**

This method is based on a statistical analysis of the average value of an economic deposit (mine), the chance of discoveries becoming economic and of anomalies (drill targets) becoming discoveries. This method is somewhat subjective.

13) Replacement Value

What it costs bo build a new mine/mill complex is not relevant to the value of a particular deposit. The mine/mill complex only has a value insofar as it enables one to generate cash flow. Only the salvage or disposal value is relevant if you cannot generate cash flow.

14) Value per ton of Ore in the Ground

This method is extremely arbitrary since the material in the ground has no value until you establish the relationship between grades, recovery, metal prices, costs and so on. However, brokers and analysts often determine approximate values for gold properties by applying market determined factors of "dollars per ounce of contained gold".

15) Payback Period

This determines when all your investment is repaid, and ignores the impact of cash flow in later years. For example, you could invest $100 million and demand a four year payback. However, your returns could be $20 million a year for four years (which doesn't payback in four years) and then be $200 million in year 5. The arbitrary application of the payback method would eliminate this good investment. In addition, the payback method ignores the time value of money (interest). The payback method is useful, though, when investing in politically unstable areas.

APPENDIX III

GOLD VALUATION PARAMETERS

GOLD

MARKET PRICE PER OUNCE OF RESERVES

Metals Economics
  Group (1988)   Acquisition costs for comparable gold
projects range from US $57 (Can $67) to
US $132 (Can $155) per ounce of gold in
reserves.

Burns, Fry
  (January, 1989)

Senior Producers	$148 US
Intermediate Producers	$101 US
Junior Producers	$110 US

Prudential-Bache   Mean = $160 US/ounce
  (October, 1988)

Gordon Securities: Mean = $200 US/ounce
  (July, 1988)

COMPARATIVE STATISTICS FOR GOLD PRODUCERS

(FEBRUARY, 1989)

NORTH AMERICAN GOLD PRODUCERS

	SENIORS	INTERMEDIATES	JUNIORS
Number of Companies	15	19	15
Adjusted* Market Capitalization (millions of US$)	$1,010	$97	$35
Reserves (000's of ounces)	6,500	750	330
Price/Earnings Ratio on 1989 Earnings ($425 US)	21	19	16
1992 Gold Production (000's of ounces)	500	90	55
U.S. $/Annual Ounce of Production	$2,150	$1,035	$600
P/E on 1992 Earnings ($400 Gold)	20	20	20
Adjusted Market Value (US$/ounce of reserves)	$145	$105	$110
Cash Operating Costs (US$/ounce)	$232	$283	$286

* Adding debt and subtracting working capital

(AUGUST, 1989)

An appropriate valuation method is to assign a cash value per ounce of gold in reserve for the property and divide by the diluted capitalization of the joint venture partners to obtain a "target range" of share prices appropriate for the asset value as it develops.

The amount investors (or other mining companies) will pay for an in-ground ounce of gold depends on a variety of factors influencing future profitability. In this case the remote location, the likely high capital costs and the high proportion of probable and inferred versus proven ounces are offset by the open pit configuration of the deposit, the high grades encountered and the superb exploration potential. For the present, the market will probably use the $75/oz value until the ore reserve is better defined.

		$ Canadian Per Gold Oz. Reserve		
		75	100	125
	3	$ 5.63/$33.75	$ 7.50/$ 45.00	$ 9.38/$ 56.25
Contained Ounces	4	$ 7.50/$45.00	$10.00/$ 60.00	$12.50/$ 75.00
Gold Equivalent	5	$ 9.38/$56.25	$12.50/$ 75.00	$15.63/$ 93.75
(million)	6	$11.25/$67.50	$15.00/$ 90.00	$18.75/$112.50
	7	$13.13/$78.75	$17.50/$105.00	$21.88/$131.25
		Calpine Share Price / Stikine Share Price		