SELWYN EXPLORATIONS LTD (N.P.L.)

# Shell Creek Iron Deposit

Dawson M.D., Y.T., 116 - C- 9

## PRELIMINARY REPORT

October 2, 1967

by

P. H. SEVENSMA, Ph.D., P. Eng.

President

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## ILLUSTRATIONS

# SHELL CREEK IRON DEPOSIT

## Dawson M.D., Y.T., 116 - C - 9

## 1. SUMMARY

A late Precambrian or early Cambrian iron formation is present in an easily accessible location, 45 air miles N.W. of Dawson City, Yukon Territory.

The iron minerals consist of magnetite and minor specular hematite interbedded with quartzites and chloritic slates; the formation has a thickness of several hundred feet and is known for a strike length of six miles.

The geological structure suggests an excellent chance to locate several hundred million tons of 35-40% iron - amenable to open pit mining. A preliminary metallurgical test has shown the feasibility of obtaining a commercial grade concentrate better than 63% Fe at a fine grind.

Active consideration has lately been given to railroad construction in both the Yukon and Alaska, as well as to development of potentially large power sites.

The relatively nearby Eagle Plain and Peel Plateau areas have a significant potential for the occurrence of oil and gas; coal of as yet unknown quality and limestone are known to occur in the area.

Selwyn Explorations Ltd. have acquired the area underlain by the iron formation in the belief that the time is ripe to investigate the tonnage and grade possibilities and the metallurgical characteristics of this potentially large iron reserve, the development of which may prove to be economically viable in the not too distant future.

Initial exploration of the property is estimated to cost about $70,000 - and some test drilling an additional $105,000. Preproduction exploration expenses on a property of this type would be in the order of $1,500,000 before a production decision can be made.

2. PROPERTY

The property consists of the following iron claims, measuring 2640' by 2640'.

| Claim No. | Grant No. | Date of Record |
|---|---|---|
| Shell 1-11 | Y 15302-Y 15312 | September 11, 1967 |
| Shell 12-27 | Not available yet | September 25, 1967 |

All claims are located in the Dawson Mining District, on claim sheet 116 - C - 9.

No detailed claim map will be available until the exploration crew returns from the property about October 15, 1967.

3. COMPANY

Selwyn Explorations Ltd. (N.P.L.) is a private company incorporated under the laws of the province of British Columbia on September 8, 1967.

Authorized capitalization is $2,500,000 divided into five million shares with a par value of fifty cents each.

The Company is registered in the Yukon Territory.

The Directors are:

P. H. Sevensma
W. Kaufmann
M. Cloutier
A. Neufeld
S. K. Lothrop
H. S. Aikins

Officers are:

| | |
|---|---|
| President | P. H. Sevensma |
| Vice-President | W. Kaufmann |
| Secretary | S. David Anfield |
| Treasurer | A. Neufeld |

The head office of the Company is located at 715-850 West Hastings Street, Vancouver, 1, B. C.

## 4. LOCATION AND ACCESS (See Figures 1 & 2)

The property extends from about 140° 18' to 140° 29' longitude West and from latitude North 64° 33' to 64° 36', on claim sheet 116-C-9.

The claims lie at altitudes varying between 2000' and 4800'; exposures of the iron formation are essentially confined between elevations of between 2300' and 4300'.

Access is available by helicopter from the airstrip at the end of the Clinton Creek road, located 14 miles WSW of the property, or by boat down the Yukon River, either from Dawson City or from Forty Mile to the mouth of Shell Creek. A trail follows the latter creek for 6 miles to the property.

Fair to good timber occurs between the elevation of the Yukon River at about 950' and the 3000' contour line.

A potential development-road location follows the Tintina Trench to the lower part of Shell Creek, from Rock Creek on the Klondike Highway, a distance of about 55 miles, at elevations not exceeding 2550'.

The climate is rigourous; snow is relatively light. Freeze-up of the Yukon River starts about early November and break-up occurs about mid-May.

## 5. HISTORY

Iron was discovered in this area in the summer of 1956 by Hans and Werner Krause, who staked 32 normal size claims in the winter following and recorded their find on January 14, 1957.

During 1957, the Krause brothers carried out trenching on the East side of Shell Creek and in October 1957, optioned their discovery to Asbestos Corporation (Explorations) Ltd.

History Cont'd

The initial 1957 trenches in the folded area on the East side of Shell Creek, numbered K-1 to K-4, gave iron assays of respectively 43.6, 48.7, 44.5, and 40.8% Fe, and one trench K-5 gave a 21.3% Fe assay. Ag assayed from 0.2 - 0.6 oz/t. Au, Pb, Zn and Cu all showed trace. Average widths were reported as 300'-400', with a maximum of 700'.

These assays were completed by G. S. Eldridge for Asbestos Corporation.

An earlier assay by Warnock Hersey for the Krause brothers gives additional information, in that Au, Pt, Cr and Sn were reported as nil in a 44.9% Fe sample, and Ti as 0.15%.

In 1958, Asbestos Corporation surveyed 47,600' of line, established 32 triangulation stations, traversed 34,650' with a dip needle, taking 1800 readings, dug 6 trenches and carried out reconnaissance geological mapping.

The trenching was carried out intermittently over a 3 mile length across the North limb of the folded iron formation where exposed on the North East slope of the hill West of Shell Creek, Assays in the iron formation proper varied from 14% - 35% over individual sample widths averaging about 20' and over total widths of over 200'.

The Assays of the trenches are shown in Table 1.

Subsequently, Asbestos Corporation dropped the option and the property was allowed to lapse. In 1961, the Geological Survey of Canada mapped the area on a scale of 1" = 4 miles and in 1966 the area was flown aeromagnetically by Aero Photo Inc. for the G.S.C.

This latter survey focussed the attention on the magnetic features associated with the iron formation and a comparison of Asbestos Corporation's data and the aero-magnetic survey data suggested that further investigation was warranted. The property was then re-staked and acquired by Selwyn Explorations Ltd.

6. GENERAL GEOLOGY

(A) Lithology (See Figure 2)

The iron formation is a slightly metamorphosed bedded quartzite-argillite-magnetite formation with minor specular hematite of late Precambrian or early Cambrian age (Map Unit 3 of Map 13-1962, G.S.C.)

Top:
5. Epidote-chlorite-carbonate rock of volcanic origin.
4. Phyllite, grey, green, occasional siltstone beds.
3. Iron formation; banded magnetite in quartzite and chloritic slate with minor hematite.
2. Chlorite schists, quartzites and dark limestones, quartzite, grit and greywacke.
1. Light grey limestone forming prominent jagged ridges and peaks to the north of the property.

Bottom:

A small body resembling a grandiorite crops out on the highest summit (Mount Simba) of the iron range; it may be an intrusive, or a coarser phase of the volcanic rocks present on the ridge further to the East.

No actual thickness is available for any of the above formations, but they are measured in hundreds of feet, rather than in thousands.

According to the Asbestos Corporation interpretation the iron formation is made up of a 75' thick bedded zone, overlain by a barren zone of 300', which in turn is overlain by another bedded iron formation about 200' thick.

Neither the mapping nor the the report filed with the Mine Recorder by Asbestos Corporation show the true relation between these two iron-bearing members, which could be different limbs of a fold. Significant average grades reported by Asbestos Corporation are as follows:

| | | |
|---|---|---|
| Trench | 1 A | 137' of 24.6% Fe |
| | 2 | 30' of 31.6% Fe |
| | 3 | 41' of 28.3% Fe |
| | 4 | 147' of 25.0% Fe |
| | 5 | 116' of 25.5% Fe |
| | 6 | No assays available at present |

Field examination by the writer, indicates larger widths and better grades outside the trenched areas.
No actual measurements have yet been taken, but iron formation of good grade was found, apparently in place up to some 400' slope-distance above trench number 2; the metallurgical sample was taken in this area.

Line cutting is required to survey in the actual location of the contacts, and the true widths, as a compass is useless in the magnetic environment, and during the first two weeks of October, initial survey work will be carried out.

(B) Structure

Asbestos Corporation's mapping shows clearly the folds affecting the iron formation on the East slope above Shell Creek.

The general character of the sharp chevron folding, often accompanied by strike faulting, all lying parallel to the Tintina Trench about 2½ miles to the SSW, is very well evidenced by the surrounding limestones, and there is no doubt that the folding in the iron formation as exposed on the East slope of Shell, is also present in the West slope and continues along strike to the WNW, and is of the same general character as in the limestones.

In the East slope, the folded iron zone lies between elevations of approximately 2600' and 3200', over a length of ½ mile, South of trench 6; this is the area where the original trenches showing 40 - 48% Fe over great thicknesses are located.

Here this folding extends over a vertical range of at least 600' and has apparently, as is usual in these structures, caused an enrichment of the iron-zone to a commercial grade.

(C) Aeromagnetics

Plotting the location of the exposed limb of the iron zone as mapped by Asbestos Corporation, on the aeromagnetic map, (Figure 3) it is readily seen that this location does not correspond to the magnetic high in the area of trenches 1,4 and 5.

Aeromagnetics Cont'd

The next anomaly peak to the West coincides with that part of the iron formation where no sampling was done by Asbestos Corporation.

In addition, the original map shows iron formation float occurring up-slope from the mapped iron formation and a reconnaissance by the writer above trench 2, shows clearly the existance of exceptionally good grade iron formation above this trench and trending up-hill in a due West direction.

Stripping with a mattock rapidly exposes the formations underlying the thick moss-cover, and it is believed that work of this type can trace the actual boundary of the iron formation within a very short time in critical locations.

Another feature of interest in the area examined by the writer, is the fact that in float of the hanging wall phyllites, the regional cleavage cuts the original bedding at angles varying anywhere from 0 to $90^{o}$, clearly indicating significant folding.

In addition, local sharp folds have been observed in the iron formation, but no pronounced cleavage is observed in this member. When the East slope folds are projected to the NNW and compared to the magnetic pattern, it is readily apparent that the buried Southerly syncline is reflected for a length of about 4 miles by a gentle magnetic depression, whereas the magnetic high no doubt reflects the intensity and width of the more intensely folded North half of the buried part of the iron formation.

It is also apparent that between the two magnetic peaks, the magnetics and the mapped trace of the iron formation do not coincide at all, which is likely due to the fact that different limbs of a fold structure have been correlated as one and the same limb.

In conclusion, we surmise that the two areas of the magnetic highs are likely to be underlain by a broad folded section of iron formation comparable to the North half of the higher grade exposure along the East slope of Shell Creek.

(D) Grade Considerations

Assay data from samples taken across the folded area at the east end of the deposit were examined by the writer while the property was under option from H. and W. Krause. The assays, from trenching done in 1957, showed Fe content to vary from 40.8% to 48.7% across widths of from 300 to 400 feet, with a maximum width in one case of 700 feet. These results were from trenches K-1, K-2, K-3 & K-4 and were not referred to in the report on the 1958 program, which was the only report filed as representation work. It should also be noted that the report as submitted gave weighted averages based on interpretations which, in the light of more recent geological and air borne magnetic survey data, may require substantial modification.

Assay averages from trenches on the north limb show values of about 25% Fe over recorded widths of from 116 to 137 feet. Exposures of banded iron formation were located up slope from trench no. 2 which, although not assayed individually as exposures were discontinuous, would enhance the total picture in this area, and point to the need for more intensive investigation.

In addition, the aeromagnetic survey shows clearly that the highest concentrations of magnetite, reflected by the broad Easterly magnetic high, is present well to the South of the trenched exposure.

The narrower Westerly anomaly corresponds to the mapped trace of the iron formation but this part has not been trenched and no samples are reported.

It is usual for the best grades in this type of formation to occur in the folds; the fact that the known folded section has been reported to average about 45% Fe is normal.

Aeromagnetic evidence suggest that the anomalous pattern is caused by a body which pinches and swells; this may account for the fact that the formation is not readily observable on the West slope, where a pinching and a corresponding broadening of the Southerly synclinal part of the formation is indicated.

Grade Considerations Cont'd

This slope is tree covered, and as there are no outcrops, is as yet unexplored.

The Asbestos Corporation report states that in the East slope the plunge is to the East, which is also indicated by the aeromagnetics.

Under the prevailing type of folding, it is normal that the axis of the folds undulate, with longitudinal culminations and troughs. For this reason, the outcrop pattern on a regional basis becomes narrow and elongated, and this again is in line with the magnetic pattern and the mapping.

These various considerations all point to the great likelihood of the magnetic peaks being underlain by folded iron formation, grading about 45% Fe.

Taking 25% Fe as an average of the recorded grades for the straight limbs, and the previously reported grades averaging about 45% Fe in the folded sections, a potentially commercial of 35% Fe is obtained which, in view of the foregoing, the writer believes, to be a sound estimate and a reasonable target with considerable room for upward revision.

7. TONNAGE CONSIDERATIONS

Both areas of interest, outlined by the magnetic peaks, measure approximately 1½ miles long, by about half a mile wide between the 58,500 gamma contour.

The area of major interest measures consequently 3 miles long by ½ mile wide, or about 15,800' x 2,600', that is about 41 million square feet. At *9 $Ft^3$ /ton, which is the approximate tonnage factor for 35% Fe as magnetite in quartzitic rocks, this represents 4.5 million t.p.v.f.

* Tonnage Factor Formula: T.F. = 11.85 - 0.079 (f)

f = % Fe in magnetite

$T.F._{(Shell\ Creek)}$ = 11.85 - 0.079 (35) or 11.85 - 2.76 = 9.09 $Ft^3$ per ton.

Tonnage Considerations Cont'd

The area of interest consequently involves about 4.5 million tons per vertical foot. (t.p.v.f.)

If the iron formation is assumed to have a 200' vertical thickness which in itself is a considerable safety factor because of the likely increase in vertical thickness due to folding, we are then considering a potential of nearly one billion tons.

A minimum economic objective in this area is estimated at 250-300 million tons of 35% Fe or better, minable by open pit at a waste to ore ratio of 1:1 or less.

In conclusion, the potential of this objective is sufficiently large to warrant serious investigation.

## 8. METALLURGICAL CHARACTERISTICS

An initial metallurgical sample has been taken in the area uphill from trench #2, i.e. from the upper 50'-100' wide more argillaceous and fine grained section, to provide information on the possibility of obtaining a commercial grade concentrate and to determine what impurities, if any, are present in this portion of the iron-zone.

This sample has been submitted to Britton Research in Vancouver; when the complete report is received, it will be attached as an appendix to this report.

Preliminary results have provided a 63.2% Fe concentrate at a fine grind and with use of the Davis tube from a head assay of 43.2% Fe.

This is considered very satisfactory and suggests that a sample including the more quartzitic and coarser portions of the ore may provide a somewhat better grade, or a similar grade at a lesser grind.

No impurity assays are yet available at the time of writing.

## 9. ECONOMIC CONSIDERATIONS

The economic value of any deposit depends upon the marketability of its products, and as for all ore deposits, market studies will have to proceed concurrent with the investigation of the deposit.

Essentially, a 65% Fe grade magnetite concentrate will realize about $10.00 per ton F.O.B., a west coast port, and a pellitized product about $13.00 per ton, under prevailing market conditions.

This requires a large tonnage operation, that is mining between 15,000 and 30,000 t.p.d. and shipping about 60% of this tonnage as a marketable product.

Economic Considerations Cont'd

Aside from the availability of power which present no major obstacles, transportation is the main cost factor.

In this particular case, the climate for railroad transportation, either through the Yukon or through Alaska, is being viewed in a much more favorable light in recent years and active studies of this problem have recently been conducted by other organizations, both private and governmental.

Large iron deposits have been found by Crest Exploration in the NE part of the Yukon.

Serious consideration will be given to erection of a base metal smelter in the Anvil area of the Yukon.

Clinton Creek Asbestos, 14 air miles west of Shell Creek, is programmed to start production at the rate of 60,000 tons of asbestos fibre annually, in the near future.

The outlook for significant oil and gas development in the Northern Yukon is favorable.

In this area of the Yukon, unlike Labrador, a major iron deposit would not have to bear the full capital cost of access to tide-water, and the traffic potential would be a strong inducement to any carrier interested in establishing or expanding a transportation facility.

The existing railhead at Fairbanks is about 200 miles from Shell Creek and a potential rail connection in the vicinity of Carmacks is about 250 miles from Shell Creek. ( Figure 1)

Whether a large project in this area could trip the balance in favour of a rail connection from B.C. to Alaska is also a factor to consider.

Investigation into the potential of this deposit is therefore particularly timely.

Technological changes and changing markets hasten the development of some deposits in the economic range. For instance, if the process for direct steel making by a continuous process becomes a reality, the feasibility of an integrated steel industry on the West

Coast becomes a function of the availability of raw materials. These factors would favorably affect the development of the Shell Creek deposit.

10. PROPOSED PROGRAM

The purpose of the initial program should be:

1. to fully assess the width, grade and metallurgical characteristics of the known folded sections on the East slopes of Shell Creek.

2. to confirm the presence of the folded portions of the iron formations in the West slope of Shell Creek, and in the areas of the two main magnetic highs on the main range, by geological mapping, geophysics and trenching.

3. to map and sample the as yet untested Westerly exposures of the iron formation in the area of the Westerly magnetic peak.

4. to test by some widely spaced drill-holes in critical locations, selected parts of these structures.

If these initial steps are successful in proving the presence of the favorable structure at an economic depth and in demostrating a favorable grade and metallurgy, successive stages of development drilling would then be justified.

Between October 1 and 15, 1967, preliminary work will be carried out to assess more closely the structure and grade in critical locations and to prepare the details of the initial exploration program.

A broad outline and preliminary cost-estimate of this initial program is as follows:

Stage 1

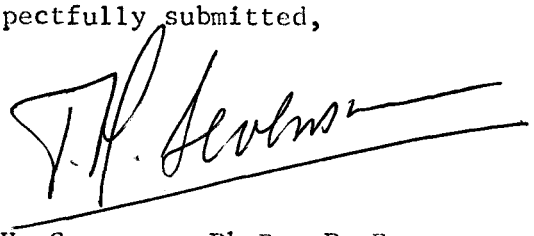
| | |
|---|---|
| Topographical Map 1" = 1000' | $ 4,000.-- |
| Tote Road from Yukon River up Shell Creek and to West end of property, 20 miles @$500 | 10,000.-- |
| River transportation (old ferry) | 2,000.-- |
| Geological Mapping | 6,000.-- |
| Magnetic surveying | 3,000.-- |
| Sampling, assaying, metallurgical testing | 6,000.-- |
| Trenching | 5,000.-- |
| Claim-surveying | 5,000.-- |
| Transportation | 3,000.-- |
| Camp costs | 5,000.-- |
| Radio communications | 2,000.-- |
| Total | $51,000.-- |
| Engineering & contingencies, 20% | 9,000.-- |
| Continuing market studies | 10,000.-- |
| Total | $ 70,000.-- |

Stage 2

| | |
|---|---|
| Selected drilling, Say 8 holes @ 750', 6000' @ $15.00 per ft. overall | $ 90,000.-- |
| Engineering & Contingencies, 15% | 15,000.-- |
| Total | $ 105,000.-- |
| Grand Total of Stages 1 & 2 | $ 175,000.-- |

Completion of this program is expected to provide sufficient information to decide whether immediate extensive exploration is justified.

Respectfully submitted,



P. H. Sevensma, Ph.D., P. Eng.
President

October 2, 1967.

TABLE 1

Results of 1958 trenching by Asbestos Corporation (Explorations) Ltd. All sample numbers increase from South to North.

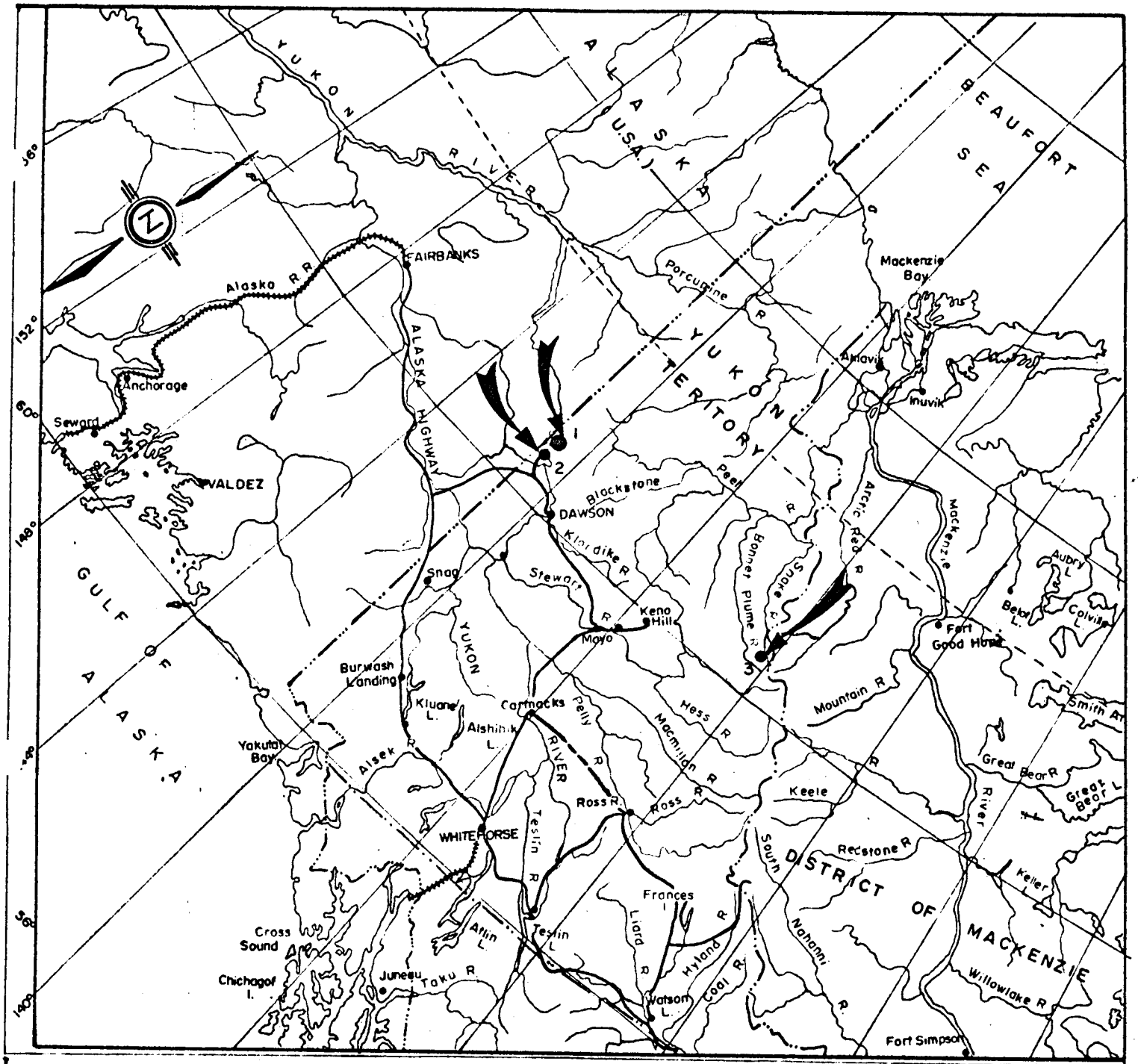
| Trench No. | Sample No. | Width | % Fe |
|---|---|---|---|
| 1 A | | | |
| | 401 | 10' | 25.0 |
| | 402 | 16' | 26.2 |
| | 403 | 8' | 28.0 |
| | 404 | 19' | 14.4 |
| | 405 | 15' | 12.0 |
| | 406 | 21' | 7.3 |
| | 401 - 406 | 89' | |
| | 407 | 20' | 21.4 |
| | 408 | 22' | 28.9 |
| | 409 | 21' | 21.2 |
| | 410 | 14' | 29.4 |
| | 411 | 9' | 31.9 |
| | 412 | 19' | 15.1 |
| | 413 | 14' | 26.8 |
| | 414 | 18' | 27.8 |
| | 407 - 414 | 137' | 24.6% average |
| | 415 | | |
| | 416 | | |

| Trench No. | Sample No. | Width | | % Fe |
|---|---|---|---|---|
| 2 | 417 | 8' | | 17.4 |
| | 418 | 30' | | 31.6 |

| Trench No. | Sample No. | Width | | % Fe |
|---|---|---|---|---|
| 3 | 424 | 13' | | 28.6 |
| | | 4' | Not sampled | |
| | 425 | 14' | | 35.2 |
| | 426 | 10' | | 29.6 |
| | 424-426 | 41' | | 28.3% |

| Trench No. 4 | Sample No. | Width | % Fe |
|---|---|---|---|
| | 436 | 36' | 24.2 |
| | 437 | 18' | 29.0 |
| | 438 | 17' | 14.3 |
| | 439 | 33' | 22.6 |
| | 440 | 21' | 30.5 |
| | 441 | 22' | 29.6 |
| | 436-441 | 147' | 25.0% |
| | 442 | 22' | 10.7 |
| | 443 | 14' | 22.5 |

| Trench No. 5 | Sample | Width | | % Fe |
|---|---|---|---|---|
| | 430 | 36' | | 26.7 |
| | 431 | 32' | | 23.6 |
| | 432 | 31' | | 26.0 |
| | 433 | 17' | | 24.9 |
| | 430-433 | 116' | | 25.5 |
| | 433-434 | 26' | No sample, schist | |
| | 434 | 29' | | 26.5 |
| | 435 | 13' | | 24.9 |
| | 433-435 | 184' | | 22% |




1 ● Shell Creek Iron (SELWYN EXPLORATIONS LTD.)

2 ● Clinton Creek Asbestos

3 ● Crest Exploration Iron

—— Road

Railroad

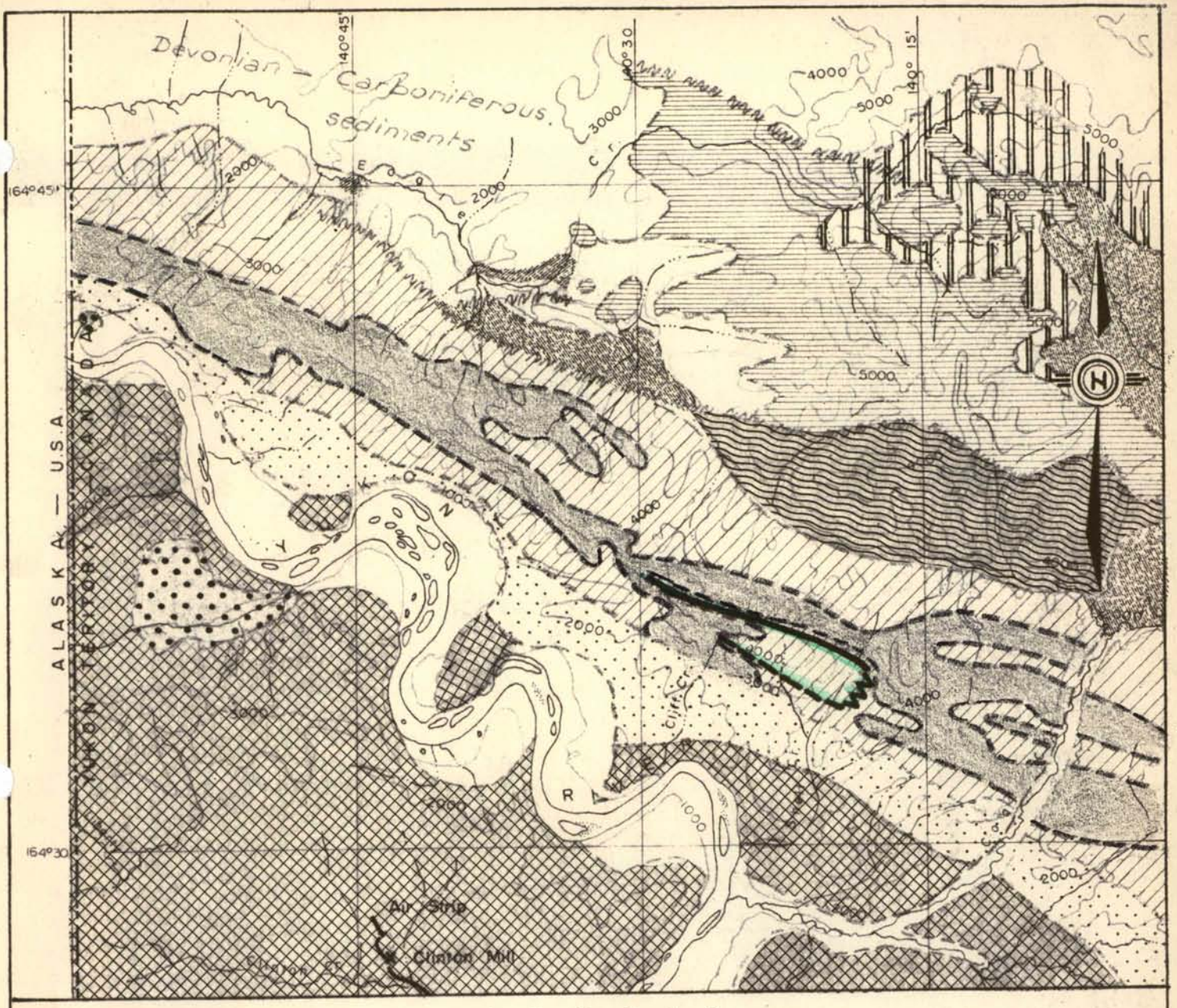
# SELWYN EXPLORATIONS LTD (NPL)
# SHELL CREEK IRON

P. H. Sevensma Consultants Ltd. Vancouver B.C.

September 1967

SCALE 0 120 Miles

FIG. 1




L E G E N D

PRECAMBRIAN
Mainly black shale & slate, and platy sandstone; minor black limestone, quartzite, orange weathering dolomite and conglomerate

PRECAMBRIAN AND/OR CAMBRIAN
Mainly buff, brown, and rusty-weathering, gritty quartzite, sandstone & quartz-pebble conglomerate; variegated coloured slates, schistose quartzite, quartz chlorite schist, quartz-mica schist & phyllite; minor limestone and black chert; iron formation
Thin to medium bedded, grey limestone

PRECAMBRIAN AND/OR LATER
Dark brown and green weathering dark green volcanic rocks, calcite filled vesicles, breccia, tuff, and agglomerate

CAMBRIAN, ORDOVICIAN & SILURIAN
Grey & buff dolomite & limestone

ORDOVICIAN & SILURIAN
Mainly interbedded chert and black & grey-green argillite; minor quartzite

CRETACEOUS(?)
fine to coarse-grained granite, granodiorite & biotite quartz monzonite

CRETACEOUS(?) & TERTIARY
brown, buff, and grey, arkosic and micaceous sandstone, shale, conglomerate

QUATERNARY
Alluvial deposits

Yukon Schists

Fault

Iron formation

FIG. 2

SELWYN EXPLORATIONS LTD (NPL)

SHELL CREEK IRON

P. H. Sevensma Consultants Ltd Vancouver B. C.

September 1967 116 – C – 9

SCALE 0 20 Mile

# SELWYN EXPLORATIONS LTD (.NPL)

## SHELL CREEK IRON

AEROMAGNETICS BY G.S.C. MAP 4285 G
Iron zone by Asbestos Corporation (Exploration) Ltd.

P. H. SEVENSMA CONSULTANTS LTD.— VANCOUVER B.C.

October 2 1967, Dawson M D—Y T, 116—C—9

SCALE 0 1/2 1 mile

Magnetic contour interval 20 gamma
Mean terrain clearance = 1000'
Topographic contour interval = 100'
Iron zone and 1958 trenches 1—6
Approximate claim boundaries
Areas of maximum potential interest

FIG 3

140° 30'

140° 13' 25"

64° 37' 22"

64° 35'

59,000

58,300

58,200

58,900

58,500

58,200

58,800

58,400

58,000

3000

3400

3500

3700

4000

2000

2500

1500

1800

5

4

2

6

3

1

A

A'

N

Creek

YUKON RIVER

Magnetic Intensity

59.000 γ

58.800 γ

58.600 γ

58.400 γ

58.200 γ

REF.

Magnetic Profile along section A — A

Elevation above sea level

4000

3000

2000

REF.

Surface

New interpretation

Asbestos Corporation interpretation

Ideal Geological Section A—A

FIG 4

# SELWYN EXPLORATION LTD (NPL)

## AEROMAGNETICS S GEOLOGICAL INTERPRETATIONS

P. H. Sevensma Consultants Ltd Vancouver B.C.

October 2nd 1967

0 1000'