

SUMMARY REPORT
SHELL CREEK IRON DEPOSIT
Dawson M.D., Y.T.116-C-9

1. INTRODUCTION

In October 1967, a Preliminary Report was prepared on the Shell Creek Iron Deposit of Selwyn Explorations Ltd. Since that time the Company has acquired copies of previous geological mapping by Asbestos Corporation, has staked a few more claims and obtained an Exploration Licence for coal covering some 35,184 acres. Marketing and transportation have been investigated, and the necessary applications for financial assistance under various Federal Government programs have been completed and in some cases already approved. A detailed two phase exploration program has recently been recommended by an independent mining consultant, Mr. H. E. Neal, P.Eng., who has had many years of experience in the field of iron-ore development. His recommended budget is attached hereto. The present report is intended as a summary of the salient facts to date.

<p>This report has been examined; declared acceptable as Representation Work under Section 22 and 23 of the Canada Mining Regulations and valued in the amount of \$_____</p> <p><i>Howland</i></p> <p>Date: <i>MAY 7/1969</i></p>
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*Section 40
of THE TERR
COAL REG.*

2. PROPERTIES

Located 45 airmiles NW of Dawson City, Yukon, on the North side of the Yukon River (Fig. 1 & 2), the holdings consist of:

(a) 29 iron claims covering an area of approximately 4,600 acres

Details of this holding are as follows:-

Claim Name:

Grant No:

Shell 1 - 29 Iron

Y 15302 to 15330

(b) Coal Exploration Licence No 1, covering approximately 35,184 acres.

3. LOCATION AND ACCESS

The claims lie at altitudes varying from 2,000' to 4,800', on claim sheet 116-C-9, Latitude $64^{\circ}34'$ North, Longitude $140^{\circ}24'$ West.

Exposures of iron formation lie mainly between elevations of 2,300' and 4,300'.

Access from Dawson City is inconvenienced by the fact that although the Shell Creek deposit is only some 15 miles from the Clinton Creek Asbestos mine, our properties lie on the opposite side of the Yukon River. Road access during the exploration stage is, therefore, possible only during the winter when an ice bridge can be utilized. Various river craft can be employed during the summer months both directly from Dawson and for crossing the river near the abandoned settlement of Forty Mile which has recently been connected to the highway by a 3 mile tote road.

An aircraft landing strip on the north side of the river could be connected to the property by a tote road with no great difficulty and some preliminary work on this has already been initiated.

Timber available in the immediate area is suited for only the crudest type of structure but will be of substantial value for bridging, cribbing and similar uses. The climate is rigorous, snowfall moderate and the Yukon River is ice-free from about mid May to early November.

4. HISTORY

Discovered and staked in 1956 by Hans and Werner Krause, their claims were optioned by Asbestos Corporation (Explorations) Ltd., who obtained iron assays of between 40.8% and 48.7% over widths from 300' - 400', with a maximum of 700', in a large exposed folded portion of the magnetite iron-formation on the East side of Shell Creek.

Subsequent geological mapping, dip needle surveying and hand trenching along the unfolded exposed limb of the iron formation west of Shell Creek indicated widths in excess of 400' of iron formation and partial sampling of this unit returned values of from 22% Fe over 184' to 25% Fe over 147'. Permafrost conditions and the hand methods employed precluded the exposing and sampling of any complete sections.

No structural correlation was obtained between the folded portion on the East side of Shell Creek and the straight limb trending away to the NW on the West side of Shell Creek.

Claims covering the property were allowed to lapse in 1962 as a result of Asbestos Corporation dropping its option.

In late 1966, the Geological Survey of Canada published regional aeromagnetic maps which strongly suggest that the higher grade folded portion is present on the West side of Shell Creek, and that these folds pinch and swell, giving rise to at least two large areas where higher grade folded iron formation is present at relatively shallow depth.

A field examination suggested that this interpretation is correct and much good grade iron formation was observed under a shallow cover of talus and moss well beyond the areas previously trenched.

A geological examination indicated the persistence and regional character of the folding.

5. GEOLOGICAL SETTING

The Shell Creek magnetic iron formation occurs in late Precambrian or early Cambrian quartzites and chloritic phyllites with minor volcanics underlain by abundant limestones. Relatively little chert has been observed.

The texture and lithology are comparable to those of the minable magnetic iron formations of Eastern Canada, where in some operations grades as low as 20 - 22% are mined for processing into iron pellets.

The geological setting is thus the classical setting of many of the large North American iron deposits.

The Shell Creek Deposit is of about the same age as the large, high phosphor, hematite deposits held by Crest Exploration in the Eastern Yukon.

No other substantial magnetite deposits are known to occur in the Northern Yukon Iron Belt.

6. POTENTIAL TONNAGE

The aeromagnetic data suggests that two folded areas have major tonnage indications. As it is certain that the thickness of the formation is 400' and as these two areas have a width of about ½ mile and a combined length of about 3 miles, there is an indicated potential tonnage in the areas - using a tonnage factor of 9 cu Ft/t of :-

$$\frac{15,800 \times 2,600 \times 400}{9} = 1.8 \text{ billion tons.}$$

Additional tonnage potential could be inferred from the nature of the folding, particularly as it is revealed on the east side of Shell Creek, which area is not included in the above calculation.

From the foregoing calculations and observations it is readily apparent that something in excess of 2 billion tons of near-surface iron formation may be available for testing.

Geological structures, topography and such engineering considerations as stripping ratio, pit design, waste disposal and haulage may well render much of this total unrecoverable, but present judgment suggests that at least 25% or 500 million tons of potential iron ore grade material could be recovered under optimal mining conditions.

The potential of the deposit is, therefore, sufficient at this distance from Tidewater to warrant more detailed investigation. The best assumption with regards to the overall grade of this material is that it may be expected to lie about half way between the average 45% iron of the folded portion and the 25% iron of the straight limb, i.e. that it is in the vicinity of 35% iron (see figures 3 & 4).

7. METALLURGY

Metallurgical tests by two laboratories on a random sample of a fine-grained portion of the iron formation, has given the following results :-

	Ontario Research Foundation-May 1968	Britton Research Oct. 1967
Crude % Fe	41.9	43.2 (calculated)
Grind % -325M	100.0	86.2
<u>Davis Tube Concentration</u>		
% Fe	66.3	59.4
% Silica	5.9	14.5 (with 59.4% Fe)
D.T. on -325M Portion	-	63.2
Titanium (TiO ₂)	0.16	0.21
Phosphorus	Not assayed	0.09
Sulphur	Not assayed	0.01

Previous assays by others also provide the information that there are only traces of Au, Pb, Zn and Cu, and that Pt, Cr and Sn are nil.

The assays and test results show an acceptable level of contained impurities and recoveries comparable to those prevailing in commercial deposits in Eastern Canada.

The concentrate is of a type suitable for pelletizing.

The proposed 1968 field program is designed to obtain sufficient factual data to firm up the present estimates on size, grade and metallurgical characteristics and to prepare a preliminary feasibility report.

8. FUEL

Local coal was mined and utilized in Dawson City from before 1900 to about 1910 when thawing of the ground in placer mining was converted from steam to water.

Mining on Coal Creek and on Cliff Creek was by underground methods. The coal is of a lignite to sub-bituminous type. Several seams up to 9' width are reported, both flat dips and dips of around 65° are cited.

R. G. McConnel, in 1900, listed some typical assays done by Dr. Hoffman, as follows (in %) :-

	<u>Coal Creek</u>		<u>Cliff Creek</u>	
Hygroscopic Water	18.31	19.37	8.57	10.58
Volatile combustibles	34.96	33.85	42.04	40.10
Fixed carbon	40.88	37.45	45.77	46.74
Ash	5.85	9.33	3.62	2.58
Total	100.00	100.00	100.00	100.00
Coke percentage	46.73	46.78	49.39	49.32

A detailed study of this coal will be required following the proving of an adequate iron reserve.

New oil and gas discoveries have recently been made by Western Minerals about 100 miles NE of Shell Creek (see fig. 1)., but the potential of this field cannot yet be assessed.

9. MARKETING

The most suitable product for the expanding pellet market, by about 1974, is expected to be a pre-reduced pellet containing 90% Fe, which it is estimated will command a price of US\$35.00 per ton.

As iron ore and coal are both present, the Shell Creek Deposits are in good competitive position if both materials prove suitable for the production of this type of pellet.

A preliminary letter of intent has been obtained from Sumitomo Shoji Canada Limited, and negotiations for a more formal Letter of Intent to Purchase are underway. Negotiations are presently underway with Friedr. Krupp GMBH, Essen, Germany and Rlytechna, Prague, Czechoslovakia for the sale of pre-reduced iron pellets and the purchase of mining equipment on long term credit.

Required production would have to be of the order of 5 million tons per year, with a 20 year sales contract.

10. TRANSPORTATION

The Canadian National Railways have assured Selwyn Explorations Ltd. that they will build the approximate 450 miles of railroad to Tidewater when the economic feasibility of the Shell Creek project has been proven and sales contracts completed subject to securing financial assistance from the Canadian Government.

A British Columbia Dock and Terminal Operator has assured Selwyn Explorations Ltd. that they will construct a deep sea terminal capable of handling upto 150,000 DWT vessels, with a loading capacity of 6,000 tons per hour, subject to the same conditions as the railway.

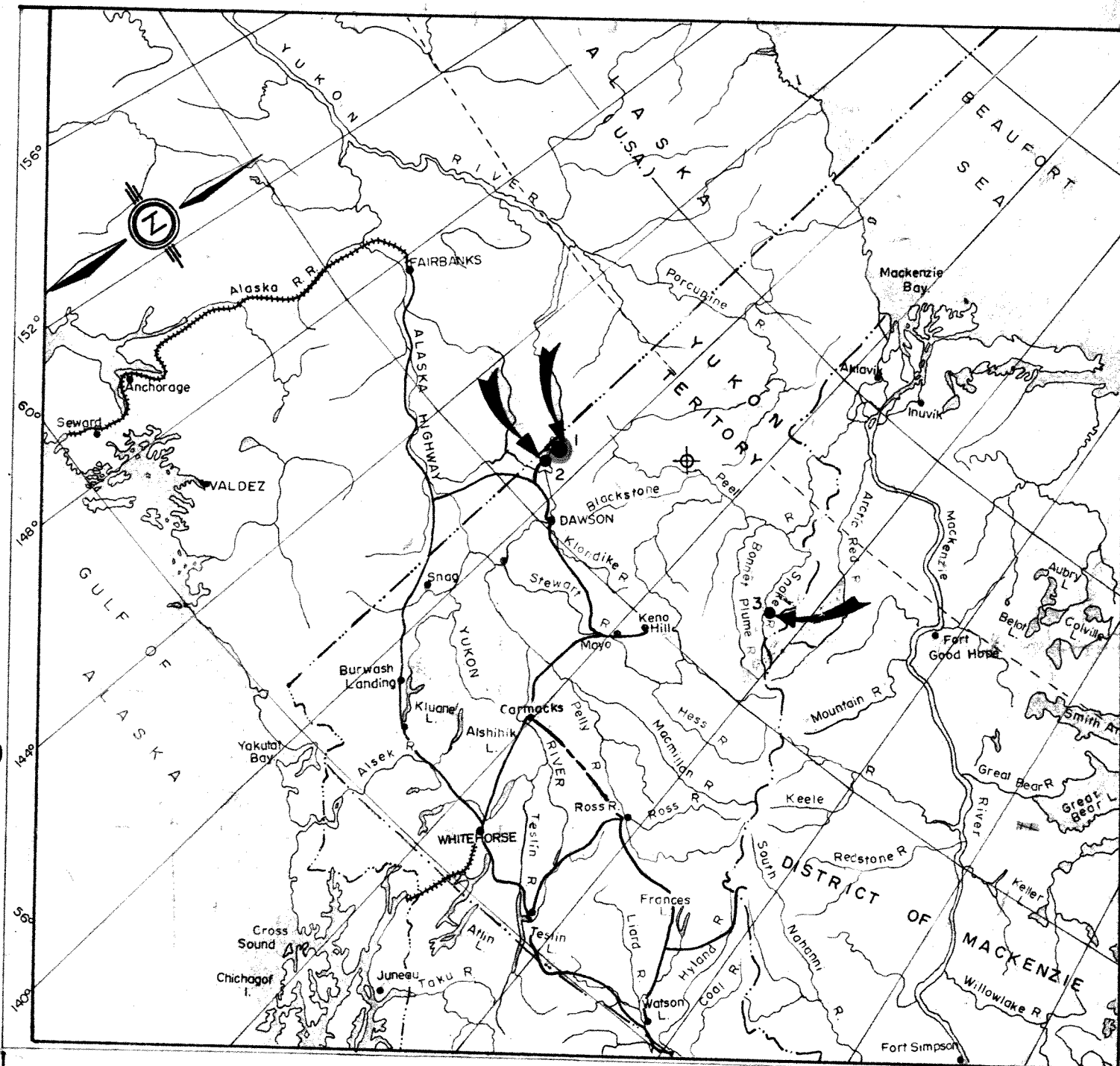
Preliminary studies indicate that shipping a high grade product in large vessels to markets other than the main Japanese market is economical.

11. SUMMARY

The Shell Creek iron deposit is the only magnetite deposit known in the Northern Yukon Iron belt and is accessible. Its size and probable grade and the presence of coal nearby, and of oil and gas about 100 miles to the NE suggest a strong possibility that it may serve as the source for the production of high grade pre-reduced iron pellets of 90% Fe. It is known that markets are available and a preliminary Letter of Intent to purchase pellets has been obtained. If the project is economically feasible and sales contracts are signed, Railway and Terminal Operators are prepared to build the necessary transportation and loading facilities. The project has been reviewed by an independent consultant specialized in the iron business, Mr. H. E. Neal, P.Eng., from Toronto, who has prepared a budget of over \$90,000 for the 1968 field season as Phase I to be followed by a drilling program in 1969 contingent upon success in Phase I, and estimated to cost \$231,500.00. This budget is attached as an appendix to this report.

SELWYN EXPLORATIONS LTD. (N.P.L.)

Vancouver, B.C.
May 21st, 1968.



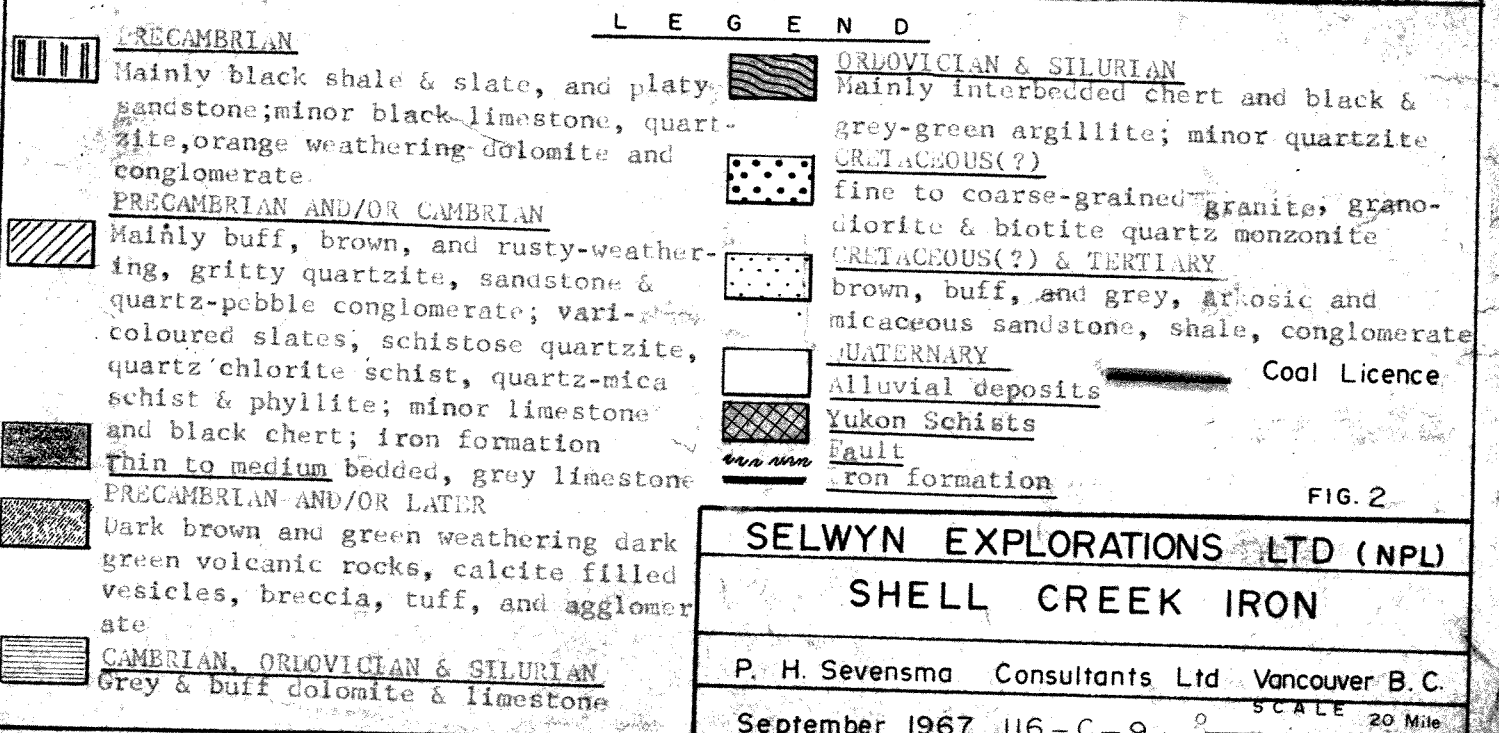
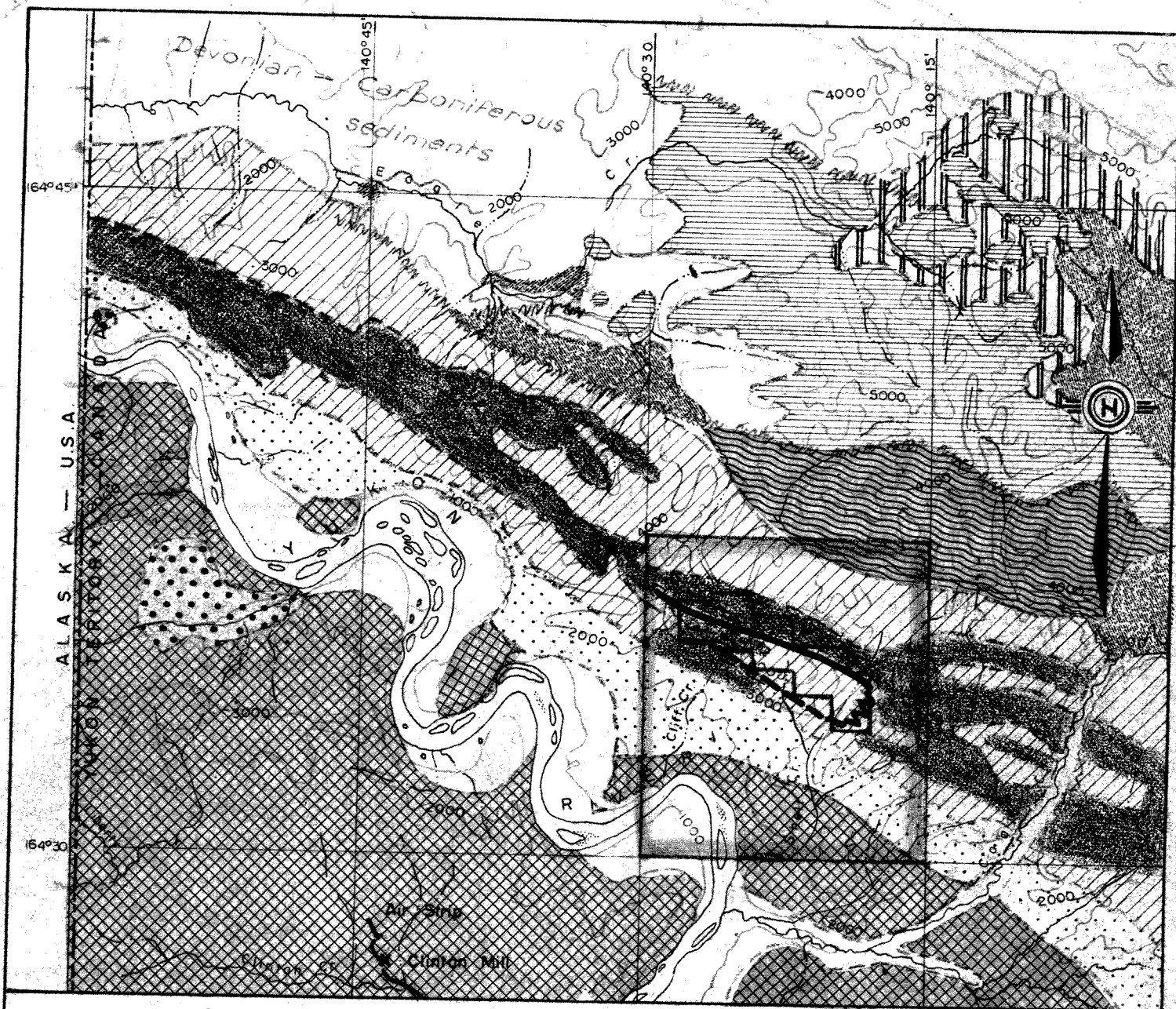
- 1 ● Shell Creek Iron (SELWYN EXPLORATIONS LTD.)
- 2 ● Clinton Creek Asbestos
- 3 ● Crest Exploration Iron
- Road
- ⋯ Railroad
- ⊕ Oil and Gas

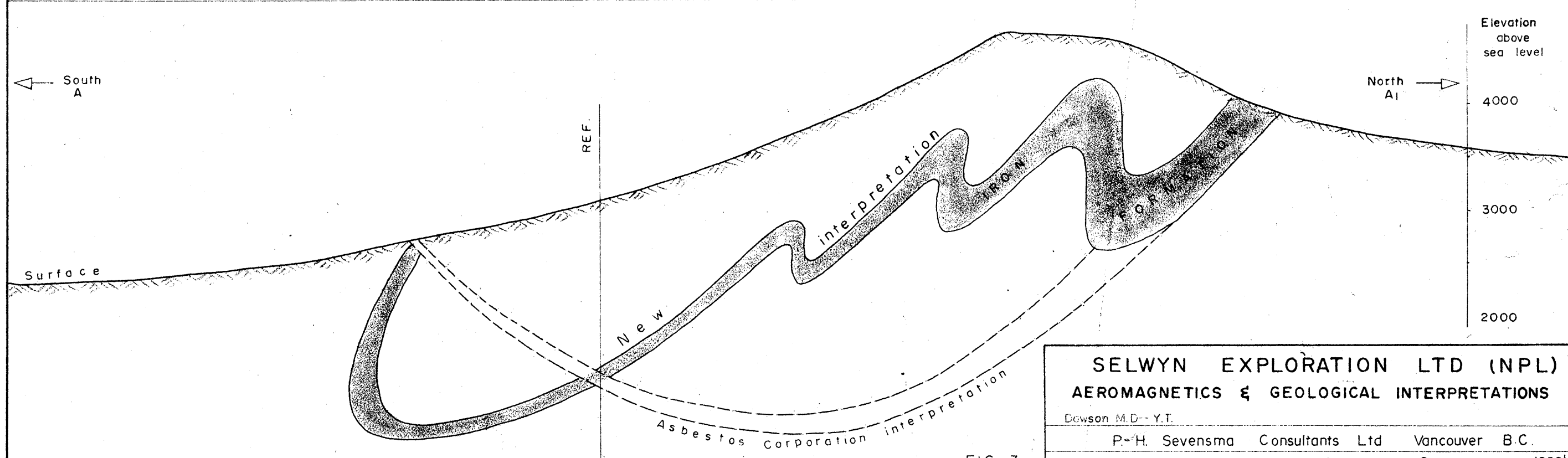
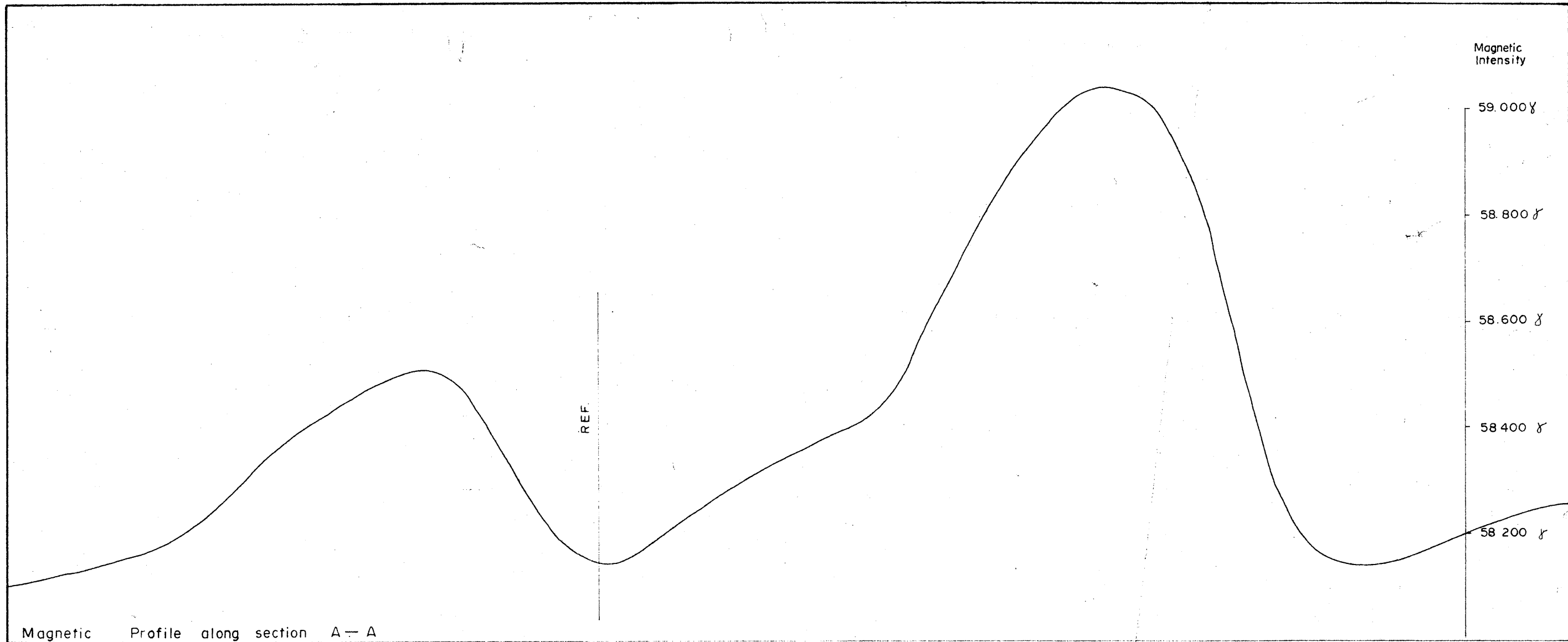
SELWYN EXPLORATIONS LTD (NPL)
SHELL CREEK IRON

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

September 1967 116_C_9 0 SCALE 120 Miles

FIG. 1





Ideal Geological Section A-A

FIG 3

SELWYN EXPLORATION LTD (NPL)
AEROMAGNETICS & GEOLOGICAL INTERPRETATIONS
 Dawson M.D. - Y.T.
 P. H. Sevensma Consultants Ltd Vancouver B.C.
 October 2nd 1967 116 - C - 9

0 1000'

SELWYN EXPLORATIONS LTD (NPL)

SHELL CREEK IRON

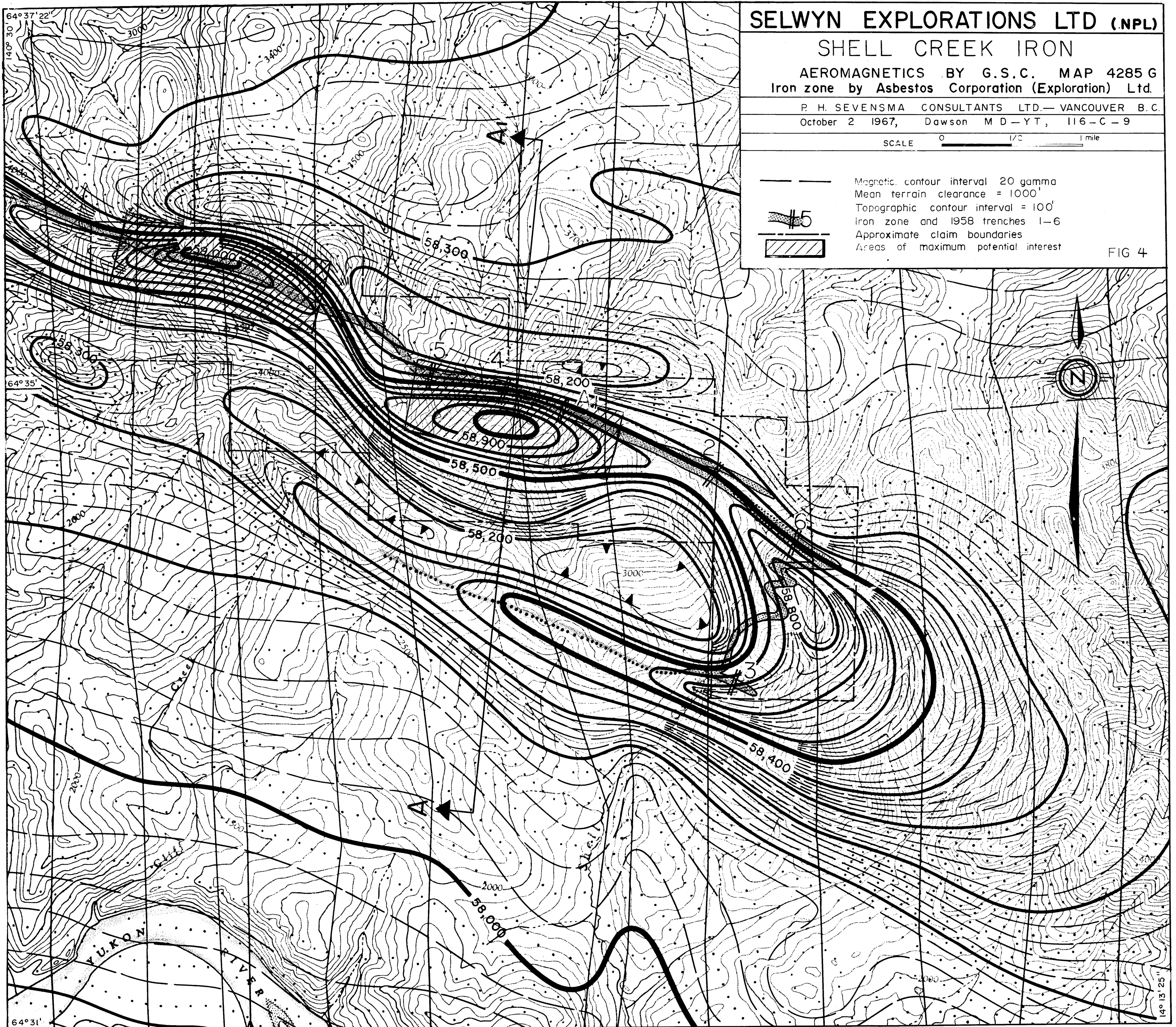
AEROMAGNETICS BY G.S.C. MAP 4285 G
Iron zone by Asbestos Corporation (Exploration) Ltd.

P. H. SEVENSMA CONSULTANTS LTD.—VANCOUVER B.C.
October 2 1967, Dawson M D—YT, 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 4



EXPLORATION BUDGET ESTIMATES

FOR

SHELL CREEK IRON PROSPECT

YUKON TERRITORY

BY

H. E. Neal, P. Eng.

May 14, 1968

EXPLORATION BUDGET ESTIMATES

FOR

SHELL CREEK IRON PROSPECT

CONCLUSIONS

- 1) Phase I - Geological mapping, magnetic surveying, trenching, road building and preliminary metallurgical testwork.

Estimated Cost: \$90,775.

Period: June 1 - Sept. 1, 1968

- 2) Phase II - Preliminary diamond drilling, continued geological mapping and metallurgical testwork followed by a preliminary feasibility study.

Estimated Cost: \$231,500.

Period: April - Sept. 1969

3) Ultimate Purpose of Programs

- a) Phase I -
- to establish the extent and quality variations of iron-bearing sediments.
 - to establish the grade and recovery of magnetic concentrates.
 - to determine if this prospect merits further detailed exploration.
- b) Phase II -
- to be contingent on establishing a large tonnage deposit of iron formation which will produce a high-grade pellet.
 - to determine the thickness and vertical extent of the most favourable zones.
 - to serve as a basis for establishing markets and potential partners.

PHASE I

Program

- 1) To construct a road from the Yukon River to the Shell Creek Prospect, a distance of about 10 miles.
- 2) To conduct a geological mapping of the belt of iron formation outlined on the Government aeromagnetic maps covering an area of 5 miles long and 1 mile wide.
- 3) To establish a base-line and cross section lines from which detailed mapping, magnetic surveys and sampling will be made.
- 4) To use a bulldozer to dig trenches to continuously expose the iron formation for sampling.
- 5) To establish as far as possible the variation in grade and beneficiation quality of the iron formation.
- 6) To determine the treatment required to produce a high-grade concentrate and pellet.
- 7) To sample the adjacent coal seams which will be cut by the road to the prospect.
- 8) To sample the limestone occurring near the iron formation.

PHASE I

SUMMARY OF COST ESTIMATE
(1968 Field Season)

1 -	Labour	\$ 26,740.
2 -	Travel Expenses	4,760.
3 -	Equipment Rentals (For Transportation to property)	6,375.
4 -	Equipment Purchases (For Camp & Outboard Motor)	5,600.
5 -	Bulldozer Operation Including operators wages, fuel but not food.	18,600.
6 -	Cookery	7,000.
7 -	Metallurgical Testwork	8,000.
8 -	Transportation Of Samples & Equipment	500.
9 -	Field Report & Data Compilation	5,000.
	Sub Total	<hr/> \$ 82,575.
	10% Contingency	<hr/> 8,200.
	Estimated Total	\$ 90,775.

PHASE I

Detailed Cost Estimate

1 - Labour Costs

1 - Party leader - (3 months at \$1500.) (Geologist - Camp Manager)	\$ 4500.
1 - Assistant geologist (2½ months at \$1000.)	2500.
1 - Dispatcher - jeepdriver (3 months at \$750.)	2250.
2 - Student field assistants (2½ months at \$600.)	3000.
1 - Student surveyor (2½ months at \$650.)	1625.
1 - Surveyor helper (2½ months at \$600.)	1500.
2 - Labourers - linecutters (\$20/day for 2½ months)	3000.
1 - Cook (2½ months at \$750./month)	1875.
1 - Supervising Consultant (4 months at \$1000.)	4000.
	<hr/>
	24,240.

Workmens' Compensation, Unemployment Insurance, Pension, etc.	1500.
Rist Insurance for personnel	1000.
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Total Labour \$ 26,740.

2 - Travel Expenses

Air Fare: Vanc - Dawson (12 x \$230. round trip)	2560.
Tor - Vanc (5 x 240. " ")	1200.
Hotels, meals etc. on route	1000.
	<hr/>
	\$ 4760.

3.- Equipment Rentals (including Bulldozer)

a) Selwyn Jeep (\$350/month for 3 months)	1050.
b) Pickup Truck (\$150/month for 3 months) (On Dawson side of Yukon River)	450.
c) Gas for Jeep from Selwyn (450 gal at \$1/gal)	450.
d) Gas for Pickup at (\$50/week) for 3 months	600.
e) Boat for Yukon River (3 months at \$100/month)	300.
f) River Ferry - from Dawson to Shell Creek (3 trips at \$500/trip)	1500.
g) Helicopter - Beaver rental	1500.
h) From Selwyn: (Transit \$150); Gas Trailer \$225; Fuel Pump \$150.	525.
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Total Equipment Rentals \$ 6375.

PHASE I

Detailed Cost Estimate (Cont'd)

4 - Equipment Purchases

a) From Selwyn	Plywood	\$200.	
	Chain Saw	\$200.	
	Trailer	\$500.	
			<u>\$ 900.</u>

b)	Plywood for tent floors, cooking		
	25 Sheet at \$20/sheet		1000.

c)	Tents	1- 16 x 20 @ \$300.	
		2- 12 x 14 @ \$150. each	
		1- 8 x 10 @ \$100.	
		1- Silk tent for fly camp \$150	

\$ 850.

d)	Cookery supplies		
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\$ 600.

e)	Outboard Motors for Yukon River		
	2 new 33 HP Johnson plus parts		

1200.

f)	Field Supplies		
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	Sample bags	\$500.	
	Sampling tools	50.	
	Sample tags	50.	
	Office supplies	100.	
	Misc. tools, chain saw	350.	
	parts, outboard motor gas		
	and oil		

\$ 1000.

Total Equipment

\$ 5600.

5 -	<u>Bulldozer</u> - For building roads & airstrip;		
	trenching.		
	(2 months at 10 hrs/day at \$25/hr)		
	Fuel 600 hours at 8 gal/hr at .75¢/ gal.		

15000.

3600.

18,600.

6 -	<u>Cookery</u> -		
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	Food: (\$7.50/ day for 12 men for 2½ months)		
	Propane fuel for cooking		

6750.

250.

\$ 7000.

7 -	Metallurgical Testwork		
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	Assaying 500 samples at 5	2500.	
	Metallurgical tests	2500.	
	Bulk Sample testing	1500.	
	Supervision	1500.	

\$ 8000.

8 -	Transportation of Samples & Equipment		
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500.

9 -	Field Report and Data Compilation by Consultant		
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\$ 5000.

PHASE II

Program

- 1) To conduct 7500 feet of diamond drilling as a preliminary program to indicate the thickness and vertical extent of the iron formation.
- 2) To calculate the indicated grade and reserves of iron formation amenable to concentration in the most favourable areas outlined in Phase I.
- 3) To continue geological mapping, trenching and sampling as a continuation of Phase I, provided it proved to be encouraging.
- 4) Preparation of a preliminary feasibility report which will outline the grade, tonnage, final grade, pit-outlines and concentration ratios of part of this iron prospect.
- 5) The completion of Phase II will provide sufficient data for preliminary market surveys and a search for potential partners and purchasers.
- 6) The attraction of this iron project from a selling point of view is dependent on the success of Phase II whereby potentially very large tonnages of concentratable ore are outlined.
- 7) Potential partners will still require a detail drill program to more firmly establish the tonnage and grades.
- 8) Phase II will provide small bulk samples for clients to test and to prepare a small quantity of pellets.
- 9) This program will consist of the following personnel:
 - 1 - Camp Manager - Geologist
 - 1 - Assistant Geologist
 - 2 - Field Assistants & Samplers
 - 1 - Dispatcher - Clerk
 - 1 - Cook
 - 1 - Drill Foreman
 - 4 - Drillers
 - 4 - Drill helpers
 - 1 - Tractor driver
- 10) Pilot plant testwork is normally conducted at this stage to establish the grinding and concentration characteristics using larger scaled equipment. This testwork normally will cost an extra \$100,000. plus transportation of the bulk sample of at least 50 tons.

PHASE 2

Supervision & Geological Mapping -		\$ 11,500.
Travel Expenses -		2,000.
Equipment Purchases -		
2 Pickups	10,000.	
1 Boat	2,000.	
Radio	3,000.	15,000.
Cookery Expense -		8,000.
Camp Construction -		10,000.
River Transportation -		5,000.
Road Construction & Repairs -		5,000.
Fuel - Tractor & Drills -		7,500.
Drilling 7500 feet at \$15/ft.		112,500.
Metallurgical Testing & Assaying		12,500.
Sample Transportation		1,500.
Preliminary Feasibility Report		10,000.
Consulting Services		10,000.
		<hr/>
	Sub Total	210,500.
	10% Contingency	21,000.
		<hr/>
	Estimated Total -	\$ 231,500.

H. E. Neal

H. E. Neal, P. Eng.

H. E. Neal & Associates Ltd.,
Mineral Consultants,
124 Roxborough Drive,
Toronto 5, Canada.

H. E. "BUZZ" NEAL, P.Eng.

President, H. E. Neal & Associates Ltd.,
124 Roxborough Drive, Toronto, Canada

Consulting Engineer - Mineral Dressing and Geological
- with emphasis on flowsheet development on laboratory and pilot plant scale; property evaluation; feasibility studies including capital and operating costs.
- Iron ore specialist with broad experience in the base metal and industrial minerals fields.

Education - University of Toronto - M.A. Geology, 1949
McGill University - Post Graduate Courses 1950-51

PROFESSIONAL STATUS

Member: Association of Professional Engineers of Ontario (P.Eng.)
Canadian Institute of Mining and Metallurgy
American Institute of Mining Engineers
Iron and Steel Institute - United Kingdom



EXPERIENCE

1962-66 Major Clients have included:

Algoma Ore Division - Algoma Steel Corporation - Grade control and process evaluation for iron ore operation.

Falconbridge Nickel Mines - Mineral dressing consulting including:

Wesfrob Project - Pilot plant testwork, flowsheet and plant design, instrumentation, equipment specifications and selection for a copper-bearing iron ore plant of 1,000,000 TPY capacity in British Columbia.

Strathcona Project - committee for layout and selection of instrumentation for 6,000 TPD copper-nickel concentrator.

Fenco - Feasibility reports, property evaluation, flowsheet development for a northern Ontario magnetite deposit, and general consulting on Adams Mine, Jones & Laughlin Corp.

Campbell Chibougamau Mines - Feasibility reports, laboratory and pilot plant testwork on iron ore properties in Chibougamau area.

Labrador Mining & Exploration Co. - Feasibility report for 5,000,000 TPY mill and pelletizing plant and general mineral dressing studies for iron ore deposit in Wabush Lake Area.

Muscocho Explorations Ltd. - Feasibility study for 1.5 and 3.0 million TPY pellet production. This study included the mining, milling and pelletizing of an iron ore deposit in the Lake Albanel Area, Quebec.

Iron Ore Company of Canada - Pilot plant evaluation and iron ore mineral dressing, Scheffer-ville, Quebec.

C. D. Howe Co. Ltd. - General consulting.

Warnock Hersey - Evaluation of the geology and ore reserves of a limestone property.

Denison Mines - Property evaluation.

Mount Wright Iron Mines - Feasibility report on an iron ore property in the Mount Wright Area, Quebec.

Holannah Mines Ltd. - Examination and drilling of nickel-copper property in Gerido Lake Area, New Quebec.

1955-62 **Iron Ore Company of Canada** - Director of Research - Responsible for laboratory and pilot plant programs for the beneficiation of the Carol Lake specularite ores and the Knob Lake earthy hematite ores. Other research studies included pelletizing of a wide variety of ores, the development of grindability tests, permafrost investigation and cargo handling problems in ocean shipping and railway cars. Feasibility and economic studies of various processes and flowsheets.

1950-54 **Iron Ore Company of Canada** - Supervisor of Exploration and Development - evaluation of earthy iron ore deposits and magnetite-specularite deposits.

1948-50 **Labrador Mining and Exploration Co.** - Staff geologist working in Labrador and New Quebec in the Wabush Lake and Knob Lake Areas.