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P.J. ANTHONY & PARTNERS

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BEACONSFIELD NICKEL PROSPECT

Tasmania

A PROGRESS REPORT

by

P.J. Anthony

P.J. ANTHONY & PARTNERS

January, 1969.

*note  
pages 3 & 4 are  
revised copies*

Submitted by .....

*P.J. Anthony*

P.J. Anthony  
Principal

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### SUMMARY

A second drilling programme at Beaconsfield involving 20 diamond drill holes failed to substantiate the higher level ore reserve estimate which was based on the first programme of drilling in which 17 holes were completed.

The ore reserve estimate at Beaconsfield comprises four ore locations and totals 6 million tons at an average grade of 1.04% Ni and 0.06% Co, using an arbitrary cut-off grade of 0.7% Ni.

The economic significance of this tonnage and grade is not known beyond doubt but the evidence available suggests that the deposit is too small to exploit economically.

It is recommended that additional work on the prospect be suspended indefinitely; that the exploration licence be relinquished; and that the Company peg and apply for Barnes Hill and Scotts Hill locations of the deposit under mining lease.

### INTRODUCTION

Since compilation and issue of Report No. 3 entitled "Beaconsfield Nickel Prospect, Tasmania" by P.J. Anthony (then Senior Geologist, King Island Scheelite) in May, 1968 a second programme of drilling was carried out at Beaconsfield. In addition a report on Evaluation of the Beaconsfield Nickel Prospect by International Technical Services Ltd. in conjunction with AMDEL has been received.

The second programme of drilling was undertaken between August and November 1968 and involved 20 holes.

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INTRODUCTION (Cont'd)

The results of these holes together with the results of the first drilling programme have been used to recalculate tonnage and grade estimates of the deposits.

The I.T.S. report is essentially a summary of the previous work outlined in K.I.S. Report Nos. 1 and 2 plus a mineralogical study plus a study of beneficiation processes. On the basis of the analytical results of 14 drill holes from the first drilling programme the average composition of an ore was calculated and the resulting figure was used by I.T.S. as the basis for rejection or selection of certain treatment processes.

This report presents a re-estimate of ore reserves using all available data and makes some comment on facets of the I.T.S. report.

Certain conclusions are drawn and recommendations are made.

THE DRILLING PROGRAMME.

Diamond drill holes numbers 18 to 37 inclusive were completed during the second programme, i.e. twenty holes for a total footage of 826 feet excluding abandoned holes. Drilling commenced on 7th August 1968 and was completed on 20th November, 1968. The relevant sections of the core were split and analysed for Ni, Co, Cr,  $Al_2O_3$ , CaO, MgO,  $SiO_2$  and FeO. The analyses were completed by the Launceston Laboratories of the Tasmanian Department of Mines. It should be noted that Minex in Melbourne performed the analyses for the first drilling programme in 1967.

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ORE RESERVES

Four separate locations - Scott's Hill, Mount Vulcan, Barnes Hill Proper and Barnes Hill South together comprise the Beaconsfield deposit.

For the purpose of ore reserve calculations an arbitrarily selected cut off grade of 0.7% Ni was used.

A tonnage conversion factor of 20 cubic feet per ton was also employed in the calculations.

Of the 37 holes that have been drilled, 24 were used in ore reserve calculations since intersections in excess of 0.7% Ni were obtained in these holes.

Barnes Hill Proper

Number of Holes used in Calculations: 16  
 Ore Reserve Estimate: 3,222,000 long tons  
 Grade of Ore: 1.03% Ni; 0.07% Co.

Overburden Estimate: 3,327,000 long tons  
 Average Depth of Overburden: 29 feet.

Barnes Hill South

Number of Holes used in Calculations: 2  
 Ore Reserve Estimate: 967,000 long tons.  
 Grade of Ore: 1.25% Ni; 0.07% Co.

Overburden Estimate: 345,000 long tons  
 Average Depth of Overburden: 10 feet.

Mount Vulcan.

Number of Holes used in Calculations: 3  
 Ore Reserve Estimate: 1,323,000 long tons.  
 Grade of Ore: 0.95% Ni; 0.05% Co.

Overburden Estimate: 1,409,000 long tons  
 Average Depth of Overburden: 21 feet.

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ORE RESERVES (Cont'd)

Scotts Hill

Number of Holes used in Calculations: 3  
 Ore Reserve Estimate: 502,000 long tons  
 Grade of Ore: 0.98% Ni; 0.06% Co.

Overburden Estimate: 1,708,000 long tons.  
 Average Depth of Overburden: 51 feet.

Total Ore Reserve Estimate: 6,014,000 long tons  
Average Grade of Deposits: 1.04% Ni; 0.06% Co.

These grade and tonnage estimates closely resemble the estimates made in Report No. 4 by T. Scott on the completion of the second drilling programme. As pointed out in KIS. Report No. 4, there are small pockets of laterite located at Beaconsfield yet to be tested. As far as is known however, these pockets are of limited aerial extent and are unlikely to significantly raise ore reserve estimates.

The possibility of obtaining a total of 10 million tons of ore of a grade of 1% Ni or better in deposits of reasonable size now seems unlikely.

COMPOSITION OF ORE

Great emphasis has been placed on the chemical composition of the ores. On the basis of the analytical information available at the completion of the first drilling programme the average composition of the ores was calculated by I.T.S. to be -

	<u>%</u>
Ni	1.06
Co	0.06
Cr	0.38
Mg	4.9

COMPOSITION OF ORE (Cont'd)

	%
Fe	20.6
SiO <sub>2</sub>	39.9
CaO	4.0
Al <sub>2</sub> O <sub>3</sub>	6.3

Employing the information from the second drilling programme together with the first the average composition of the ores is now -

	%
Ni	1.04
Co	0.06
Cr	Not determined
Mg	7.4
Fe	Not determined
SiO <sub>2</sub>	34.6
CaO	0.89
Al <sub>2</sub> O <sub>3</sub>	4.9

COMMENTS ON I.T.S. REPORT

There are three points we would like to make concerning the report -

- (1) I.T.S. have indicated that the chemical composition of the ore can vary considerably over a small area and further that the information available in calculating the mean composition of the ore is limited and that the boundaries of the 'ore' are arbitrary. Yet once having calculated the mean composition they have assumed that composition to be the truth. It is our opinion that the composition of the ore must remain doubtful until such time as sufficient holes are drilled on which to base the calculations and until possible effects of dilution from mining could be assessed. These dilution effects cannot be estimated until

COMMENTS ON I.T.S. REPORT (Cont'd)

cut-off grades are known. In other words it appears to us that any mean composition of the ore used at the present state of knowledge should be used with some caution.

(2) I.T.S. investigation of smelting techniques was limited to one unique process, the Uginex Process, as used in Oregon, U.S.A. As far as we can determine the process is not used outside Oregon. On page 54 of the I.T.S. Report, I.T.S. state that the process is capable of recovering 80% of nickel treated, yet my copy of Coleman and Vedensky (1960) states a 91.41% recovery ore to process from operating and production data 1959. On the same page of the I.T.S. Report reference is made to the "high proportion of silica" in the Beaconsfield ore and how this was undesirable, they have omitted to explain why the Oregon ore at 50% SiO<sub>2</sub> is obviously suitable when Beaconsfield with 40% SiO<sub>2</sub> is unsuitable.

I.T.S. appear not to have considered the world wide New Caledonian type smelting process or rejected it outright on the basis of a mineralogical difference between Beaconsfield and New Caledonian ores. It should be recalled that the chemical composition of Beaconsfield ore (as far as is known) appears closer to that of New Caledonia with the possible exception of Larymma in Greece, than to any other economically mined ore.

There is a great deal of published data on smelting processes of nickel silicate ores yet I.T.S. have selected one minor unique and special

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*Smelting is a chemical process and requires a suitable balance of chemical elements for example the CaO + MgO*

*is most important in determining whether or not the charge is self-fluorizing.*

*New Caledonian ore*

*CaO + MgO*

*SiO<sub>2</sub>*

*of Beaconsfield ore is more suitable than self-fluorizing*

COMMENTS ON I.T.S. REPORT (Cont'd)

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type of smelting process only for consideration. To us a distortion of the true applicability of smelting could be introduced by this bias.

- (3) The weight of published information on the Nicaro Process shows a very high capital cost of establishing a plant. Wilmshurst (a co-author of the I.T.S. Report) himself published a paper in March 1968 and quoted the following costs for establishing a Nicaro Plant.

<u>Plant Throughput</u>	<u>Capital Cost</u>	<u>Estimated Cut Off Grade.</u>
1,000 tons/day	\$30 M	1.9% Ni.
5,000 tons/day	\$75 M	1.15% Ni.
10,000 tons/day	\$120 M	1.00% Ni.

These figures are hard to reconcile with the capital estimates supplied by I.T.S. in their report.

An article in Engineering & Mining Journal, September 1957, Vol. 158, No.9 covers an expansion programme at Nicaro which involved an expenditure of \$36 M. (US) of which \$3 M. was for railroad estensions to increase production from 120,000 to 210,000 dry tons ore/month. These capital figures again suggest I.T.S. have underestimated their capital costs. The same article says on page 83 " .... the mine must supply a feed to the plant that averages out at about 1.37% Ni and 38% Fe. If iron averages less than 35% of the ore, nickel content must be higher than the 1.37% for efficient metallurgy". At Beaconsfield the average iron Content is 20% !!

Incidentally I.T.S. do not quote this reference in the bibliography.

COMMENTS ON I.T.S. REPORT (Cont'd)

It appears to us that the I.T.S. Report has added little to the state of knowledge on the subject of nickel silicate ores and the Company does not appear to be far in advance of the situation as it existed at the time of issue of K.I.S. Report No. 3 in May, 1968.

DISCUSSION

The interplay of geological/metallurgical/economic aspects of the Beaconsfield prospect should be designed in such a way as to take each consideration step by step in more and more detail as warranted and justified by the preceding stage. Only in this way can the economic feasibility of producing nickel be ascertained as systematically and as cheaply as possible. Further, such work must be co-ordinated and reviewed by a single body who must decide from all the available evidence what each step shall be and specify strict terms of reference for such steps.

The ore reserve estimate calculated in this report is well below the figure of 9.5 million tons considered by I.T.S. to be the minimum tonnage to justify economic operations. So if one is to accept the economics of the I.T.S. report as being a reliable assessment one is lead to conclude that the deposit is too small and too low grade to be worked economically at the present time.

Although we are not in full agreement with the economic assessment of I.T.S. we are of the opinion that the deposit appears too small to be an economic proposition in its own right.

CONCLUSIONS

It is concluded that the tonnage reserve of nickel silicate ore at Beaconsfield is unlikely to significantly exceed 6 million tons.

Even though the economic applicability of treatment processes is still largely unresolved there is, probably, sufficient information available to indicate that the small Beaconsfield Deposit is uneconomic at the present time.

RECOMMENDATIONS

It is recommended that the Beaconsfield project be suspended indefinitely and plans made to relinquish the existing Exploration Licence.

It is further recommended that the Barnes Hill and Scotts Hill ore locations be pegged and retained under mining lease. Mt: Vulcan is exempt from acquisition under the Act by virtue of a Reserve for Iron Ore held by the Tasmanian Government.

KING ISLAND SCHEELITE (1947) LIMITED

March 19, 1969

BEACONSFIELD NICKEL PROSPECT. E.L. 7/67

This report summarises the results from all the work and investigations made since King Island Scheelite took up an Exploration Licence covering the prospect. It covers the period in time from July 1967 to January 1969.

1. DRILLING AND DRILLING RESULTS

37 holes were drilled in two bursts of exploration activity: July - October 1967 and August - November, 1968. The results from 24 of these were used in estimating ore reserves. An arbitrary cut off grade of 0.7% Ni was used in the estimations. Tonnage conversion factor was 20 cu.ft. to a long ton.

The tonnage and grade estimate is summarised in the following table -

LOCALITY	TONNAGE	GRADE		OVERBURDGEN	
		%Ni	%Co	TONS	AV. DEPTH
Barnes Hill 16 holes	3,222,000	1.03	0.07	3,327,000	29
Barnes Hill South 2 holes	967,000	1.25	0.07	345,000	10
Mount Vulcan 3 holes	1,323,000	0.95	0.05	1,409,000	21
Scotts Hill 3 holes	502,000	0.98	0.06	1,708,000	51
<b>TOTAL ORE ESTIMATE</b>	<b>6,014,000</b>	<b>1.04</b>	<b>0.06</b>	<b>6,789,000</b>	

There is little hope of finding more ore owing to the cover of Mesozoic rocks over the serpentine.

AVERAGE COMPOSITION OF THE ORE

	<u>CALC. FROM HOLES 1-17.</u>	<u>CALC. FROM HOLES 1-37</u>	<u>NEW CALEDONIA for comparison</u>
Ni	1.06%	1.04%	2.64%
Co	0.06%	0.06%	0.21%
Cr	0.38%	N.D.	(Cr <sub>2</sub> O <sub>3</sub> 1.5%)
Mg	4.9%	7.4%	(MgO 23.0%)
Fe	20.6%	N.D.	11.5%
SiO <sub>2</sub>	39.9%	34.6%	38.0%
CaO	4.0%	0.89%	N.D.
Al <sub>2</sub> O <sub>3</sub>	6.3%	4.89%	5.0%

ECONOMIC AND CHEMICAL STUDIES

An evaluation of the prospect was made by International Technical Services Limited in conjunction with A.M.D.E.L.

The opinion was expressed that the Nicaro process (leaching with ammonia and ammonium carbonate) could be applied with some chance

of success both metallurgically and financially. The minimum amount and grade of ore necessary for successful outcome was placed at 9.5 million tons of 1.03% Nickel. The capitalisation was estimated at 19.3 million dollars.

"The discounted cash-flow rate of return at this level of investment is 20% assuming a deposit of 11 million tons, and 15% assuming a deposit of 9.5 million tons."

Discussions with the writers of the evaluation report have convinced me that the conclusions reached are as reliable as one could expect of this sort of study at this stage of exploration.

#### FUTURE ACTION

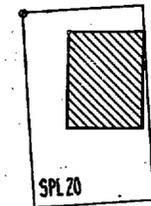
As it will cost little to maintain the Exploration Licence for another six months, it is recommended that the E.L. (expiring in April) be renewed for 6 months and during this period the several factors be again critically reviewed in case some favourable feature has been overlooked.

#### COST OF EXPLORATION

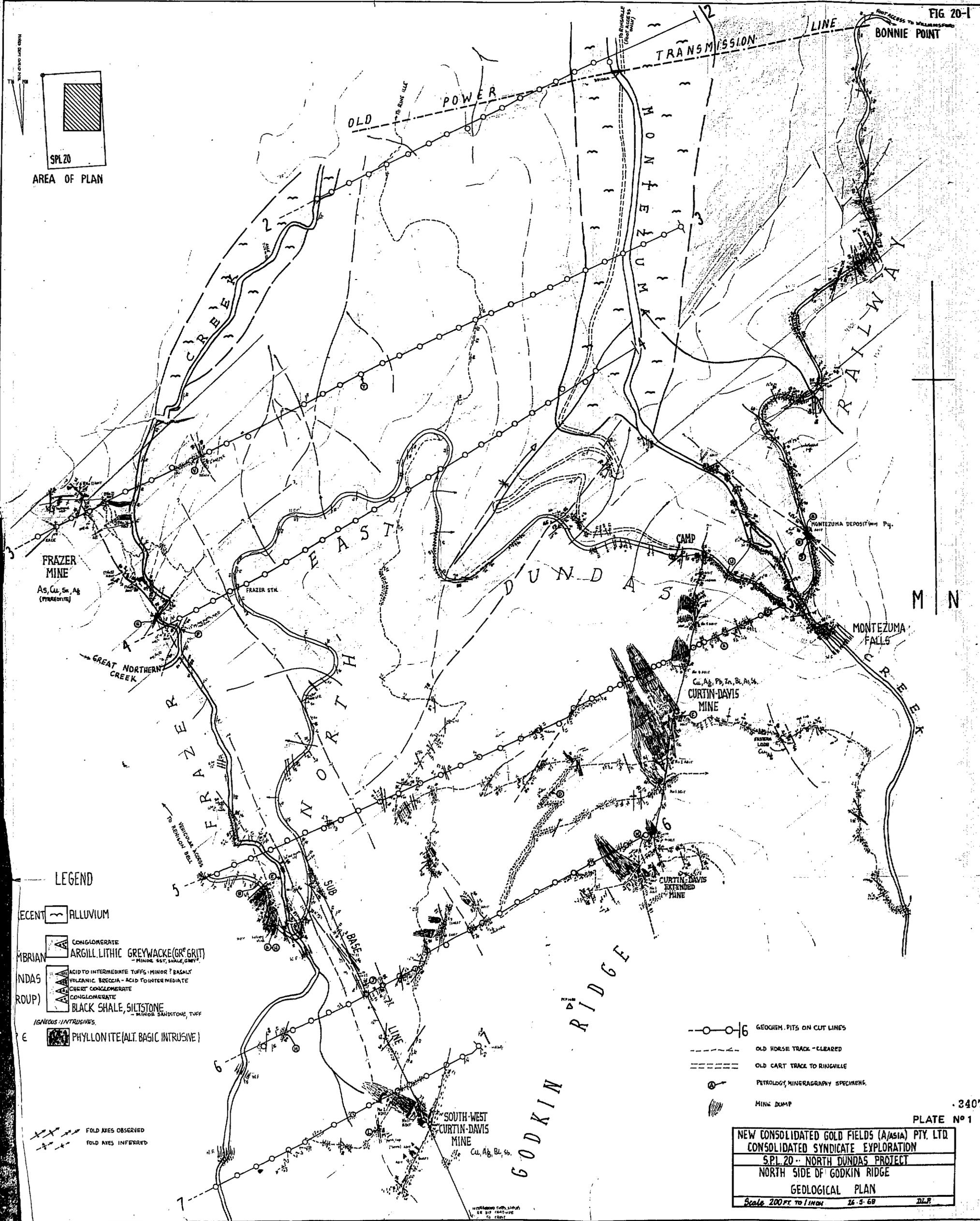
The cost of the venture is extracted from the King Island Scheelite cost statements 1967-68-69.

	LABOUR	MATERIAL	D.DRILL- ING	REPORTS	TOTAL
Year ending 31.10.67	1,879	1,176	11,022	2,551	16,628
Year ending 31.10.68	2,529	272	7,913	10,230	20,944
Year ending 31.1.69	943	72	1,975	4,899	7,889
	5,352	1,520	20,910	17,680	45,461

MARCH 19, 1969



AREA OF PLAN



FRAZER MINE  
As, Cu, Sn, Ag  
(pyrrhotite)

CURTIN-DAVIS MINE  
Cu, Ag, Pb, Zn, Bi, As, Sb

SOUTH-WEST  
CURTIN-DAVIS MINE  
Cu, Ag, Bi, Sb

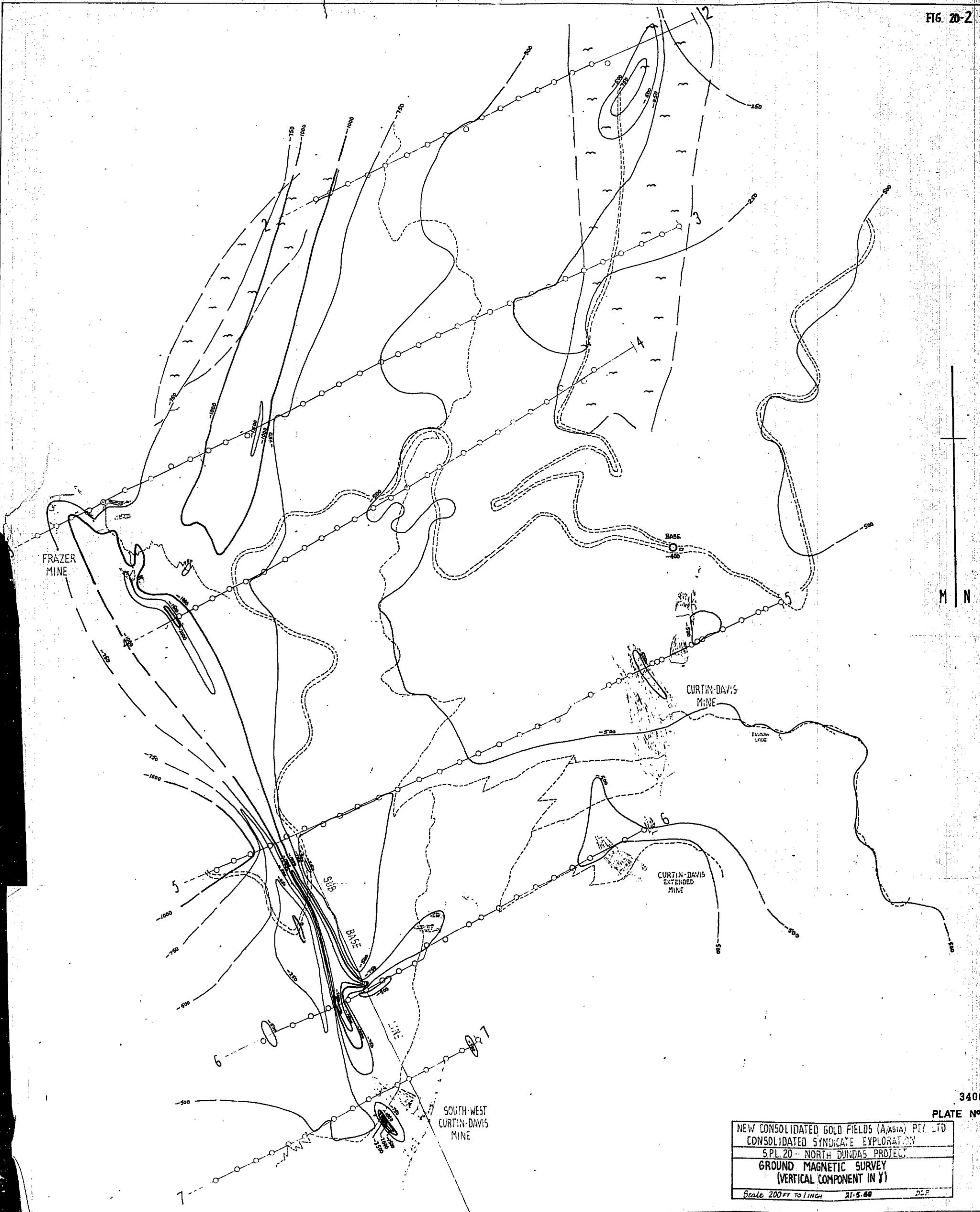
LEGEND

- RECENT ALLUVIUM
- PERMIAN CONGLOMERATE
- PERMIAN ARGILL. LITHIC GREYWACKE (GR<sup>o</sup> GRIT)  
- MINDO, S&S, SHALE, G.M.Y.
- PERMIAN ACID TO INTERMEDIATE TUFFS - MINDO? BASALT  
VOLCANIC BRECCIA - ACID TO INTERMEDIATE  
CHERT CONGLOMERATE  
CONGLOMERATE
- PERMIAN BLACK SHALE, SILTSTONE  
- MINDO SANDSTONE, TUFF
- IGNEOUS - INTRUSIVES
- PERMIAN PHYLLONITE (ALT. BASIC INTRUSIVE)

FOLD AXES OBSERVED  
FOLD AXES INFERRED

- 6 GEOM. PITS ON CUT LINES
- OLD HORSE TRACK - CLEARED
- OLD CART TRACK TO RINGVILLE
- PETROLOGY, MINERALOGY SPECIMENS
- MINE DUMP

NEW CONSOLIDATED GOLD FIELDS (A/ASIA) PTY. LTD.  
CONSOLIDATED SYNDICATE EXPLORATION  
S.P.L. 20 - NORTH DUNDAS PROJECT  
NORTH SIDE OF GODKIN RIDGE  
GEOLOGICAL PLAN  
Scale 200 FT TO 1 INCH 26-5-69 D.L.P.

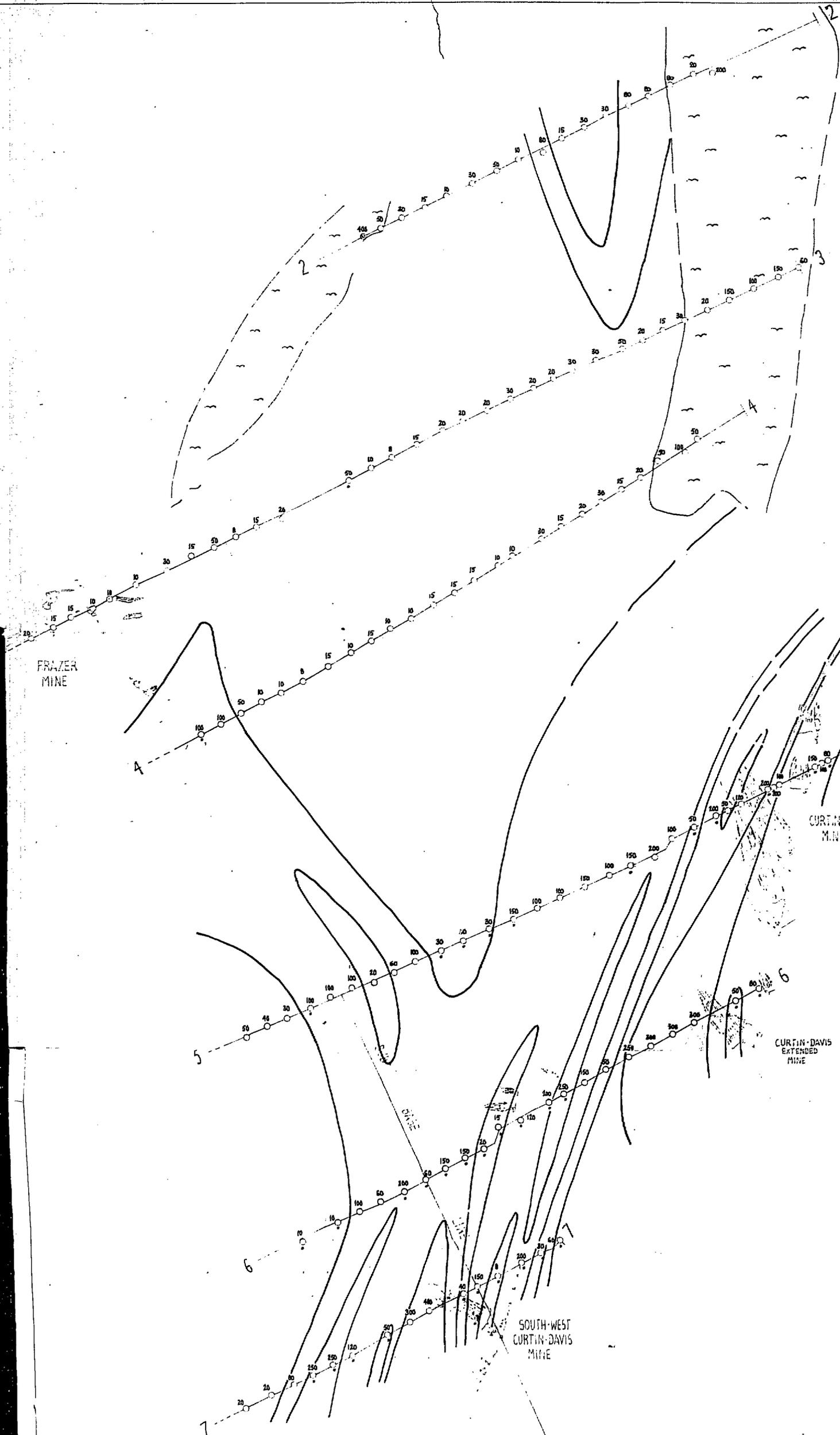


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PLATE No 2

NEW CONSOLIDATED GOLD FIELDS (ASIA) PTY LTD		
CONSOLIDATED SYNDICATE EXPLORATION		
SPL 20 - NORTH DUNDAS PROJECT		
GROUND MAGNETIC SURVEY		
(VERTICAL COMPONENT IN Y)		
Scale 200 FT TO 1 INCH	21.5.68	D.L.R.

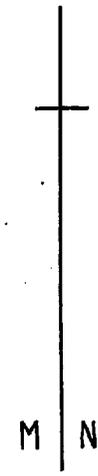


FRAZER MINE

CURTIN-DAVIS MINE

CURTIN-DAVIS EXTENDED MINE

SOUTH-WEST CURTIN-DAVIS MINE



COLOUR KEY

ppm. Pb

0-50

50-200

>200

○ SOIL

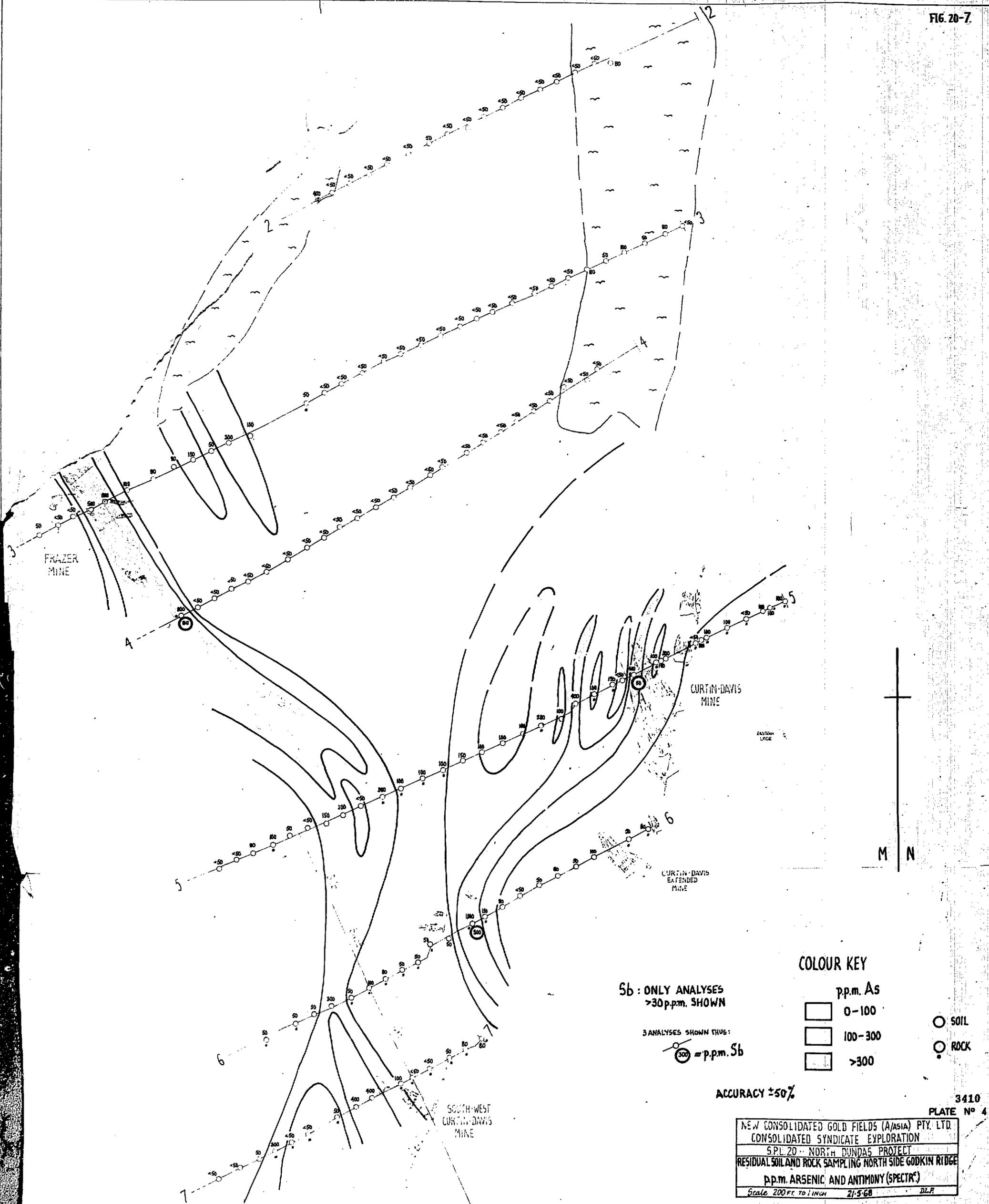
● ROCK

ACCURACY ±50%

3409

PLATE No 3

NEW CONSOLIDATED GOLD FIELDS (ASIA) PTY. LTD.  
 CONSOLIDATED SYNDICATE EXPLORATION  
 S.P.L. 20 - NORTH DUNDAS PROJECT  
 RESIDUAL SOIL AND ROCK SAMPLING NORTH SIDE GONKIN RINGE  
 ppm. LEAD (SPECTROGRAPHIC)  
 Scale 200 FT TO 1 INCH 21-5-60 DLF



COLOUR KEY

pp.m. As  
 0-100  
 100-300  
 >300

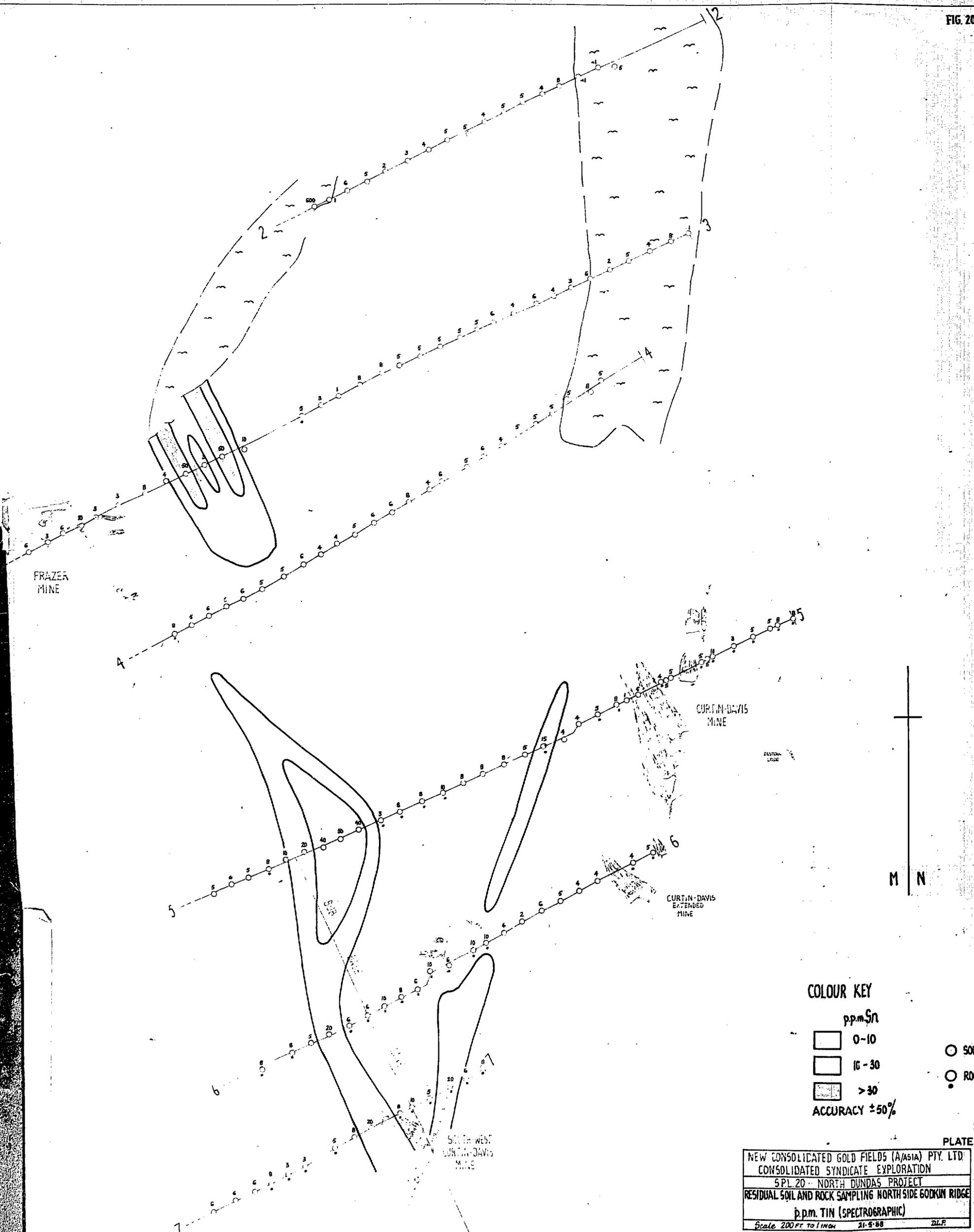
○ SOIL  
 ⊙ ROCK

Sb : ONLY ANALYSES  
 >30pp.m. SHOWN

ANALYSES SHOWN THUS:  
 ⊙ = p.p.m. Sb

ACCURACY ±50%

3410  
 PLATE No 4  
 NEW CONSOLIDATED GOLD FIELDS (A/ASIA) PTY. LTD.  
 CONSOLIDATED SYNDICATE EXPLORATION  
 S.P.L. 20 - NORTH DUNDAS PROJECT  
 RESIDUAL SOIL AND ROCK SAMPLING NORTH SIDE GODKIN RIDGE  
 p.p.m. ARSENIC AND ANTIMONY (SPECTR.)  
 Scale 200 FT. TO 1 INCH 21-5-68 D.L.P.



FRAZER MINE

CURTIN-DAVIS MINE

CURTIN-DAVIS EXTENDED MINE

SOUTH WEST CURTIN-DAVIS MINE

COLOUR KEY

pp.m Sn

0-10

16-30

>30

ACCURACY ±50%

○ SOIL

● ROCK

3411  
PLATE No 5

NEW CONSOLIDATED GOLD FIELDS (A/ASIA) PTY. LTD.	
CONSOLIDATED SYNDICATE EXPLORATION	
S.P.L. 20 - NORTH DUNDAS PROJECT	
RESIDUAL SOIL AND ROCK SAMPLING NORTH SIDE GODKIN RIDGE	
pp.m. TIN (SPECTROGRAPHIC)	
Scale 200 FT. TO 1 INCH	21-5-68 D.L.P.