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REPORT ON THE TRACE STUDIES OF LAKE

SELINA SULPHIDE MINERALISATION

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REPORT ON THE TRACE STUDIES OF LAKE
SELINA SULPHIDE MINERALISATION

INTRODUCTION

This report summarizes the results of the trace studies of pyrites from the Lake Selina mineralisation. To date fifty-six pyrite samples have been analysed for trace Co and Ni content. Some tentative conclusions are made as to the significance of these preliminary results.

RESULTS

Assays are for 1 gm samples of pyrite taken from pyrites collected over five foot intervals beginning at footage indicated.

D.D.H. 4

<u>Footage</u>	<u>Co (ppm)</u>	<u>Ni (ppm)</u>	<u>Py (%)</u>
415 - 420	325	48	21.90
445 - 450	400	40	14.60
480 - 485	520	40	12.30
510 - 515	475	33	16.70
540 - 545	875	30	9.70
570 - 575	725		12.00
600 - 605	2,180	30	21.70
630 - 635	375		25.40
660 - 665	950		14.30
690 - 695	2,400		15.00
720 - 725	550		6.50
750 - 755	575		7.89
780 - 785	1,290		4.25
810 - 815	2,100	52.5	16.14
840 - 845	1,750		9.61
870 - 875	1,400	40	12.06
900 - 905	3,100	65	7.30
930 - 935	425	23	13.30

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- 2 -

D.D.H. 4 (Cont.)

<u>Footage</u>	<u>Co (ppm)</u>	<u>Ni (ppm)</u>	<u>Pv (%)</u>
960 - 965	2,700		8.90
990 - 995	560		20.80
1020 - 1025	325	35	13.00
1045 - 1050	350	20	9.40

D.D.H. 5

<u>Footage</u>	<u>Co (ppm)</u>	<u>Ni (ppm)</u>	<u>Pv (%)</u>
210 - 215	2,300		11.80
245 - 250	2,065		8.00
275 - 280	875	25	6.70
310 - 315	1,600	33	25.60
445 - 450	1,765	70	11.00
470 - 475	2,100		12.30
500 - 505	850	58	8.00
530 - 535	1,375		9.10
720 - 725	1,575		28.30
750 - 755	1,700	35	15.80
780 - 785	650		22.90
810 - 815	700		16.20

D.D.H. 6

<u>Footage</u>	<u>Co (ppm)</u>	<u>Ni (ppm)</u>	<u>Pv (%)</u>
215 - 220	875	88	3.50
285 - 290	1,500	220	1.50
310 - 315	3,800		6.50
340 - 345	2,300	120	3.90
630 - 635	270		6.00
740 - 745	1,685		9.00

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- 3 -

D.D.H. 6 (Cont.)

<u>Footage</u>	<u>Co (ppm)</u>	<u>Ni (ppm)</u>	<u>Pv (%)</u>
770 - 775	1,925		15.50
800 - 805	900	90	5.30
830 - 835	1,600		7.80
860 - 865	1,240		18.10
900 - 905	950	120	10.10
930 - 935	1,500		13.50

Surface Samples

<u>No.</u>	<u>Co (ppm)</u>
A	675
B	700
C	2,440
D1	1,685
D2	2,030
E	5,800
F	695

COMMENTS

It is considered that the high Co values (1,000 ppm or greater) in the pyrite are an indication that Cu was present in the mineralising solutions. Low Co (500 ppm or less), as in the case of Lyell Reserve, would be an indication that there was little Cu in the mineralising solutions. This conclusion is based on the general geochemical correlation of Co and Cu.

However, as Cu forms its own phase whereas the Co preferentially substitutes into the pyrite structure, the fact that both elements were originally present in solution doesn't necessarily imply that both will be deposited. This will depend on the prevailing physiochemical conditions.

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Considering the general ubiquity of pyrite it is in fact probable that pyrite will deposit rather readily, thus ensuring the precipitation of the Co. At the same time it is conceivable that the Cu is lost from the system as conditions for the deposition of chalcopyrite were not suitable.

Obviously the critical problem is to determine the factors which inhibit or promote the precipitation of chalcopyrite and if possible to recognise their presence in the geological record.

Recent work by Helgeson ("A chemical and thermodynamic model of ore deposition in hydrothermal systems") has suggested that temperature, conc. of brine solution and pH, are probably most significant (assuming the system has not undergone any mechanical interruption).

For Example

1. At 300°C a conc. brine reacting with hosts of acid composition only precipitates pyrite and magnetite. Considerable reduction of solution species occurs as the reaction proceeds. If the brines are diluted then chalcopyrite will be precipitated at a later stage. Negligible pH change occurs during the reaction.
2. At 200°C conc. brines precipitate pyrite followed by chalcopyrite. Bornite will precipitate if the pH increases sufficiently. No magnetite precipitates and the solution species undergo reduction as the reaction proceeds.
3. At 100°C minor pyrite and bornite precipitate..

From the theoretical calculations a number of points are apparent:

- (a) The amount and distribution of magnetite occurring in the mineralised zone might be used as an indication of high temperature. It now becomes important to look at the magnetite both in Prince Lyell and Selina.

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- (b) The conc. of brines at the higher temperatures is critical. The recognition of its influence will be difficult.
- (c) The increasing pH, as reaction proceeds, is generally related to a reduction of the oxidation states of the species in solution. It may be possible to detect this reduction by the examination of the oxidation states of Mn in the chlorites. This could then give a direct reading of how far the reaction has proceeded in terms of pH.

It should be noted that all of the above assumes that later metamorphism has not significantly altered the picture. The effects of the later metamorphism are not known at this stage.

CONCLUSIONS AND SUGGESTED DIRECTIONS OF RESEARCH

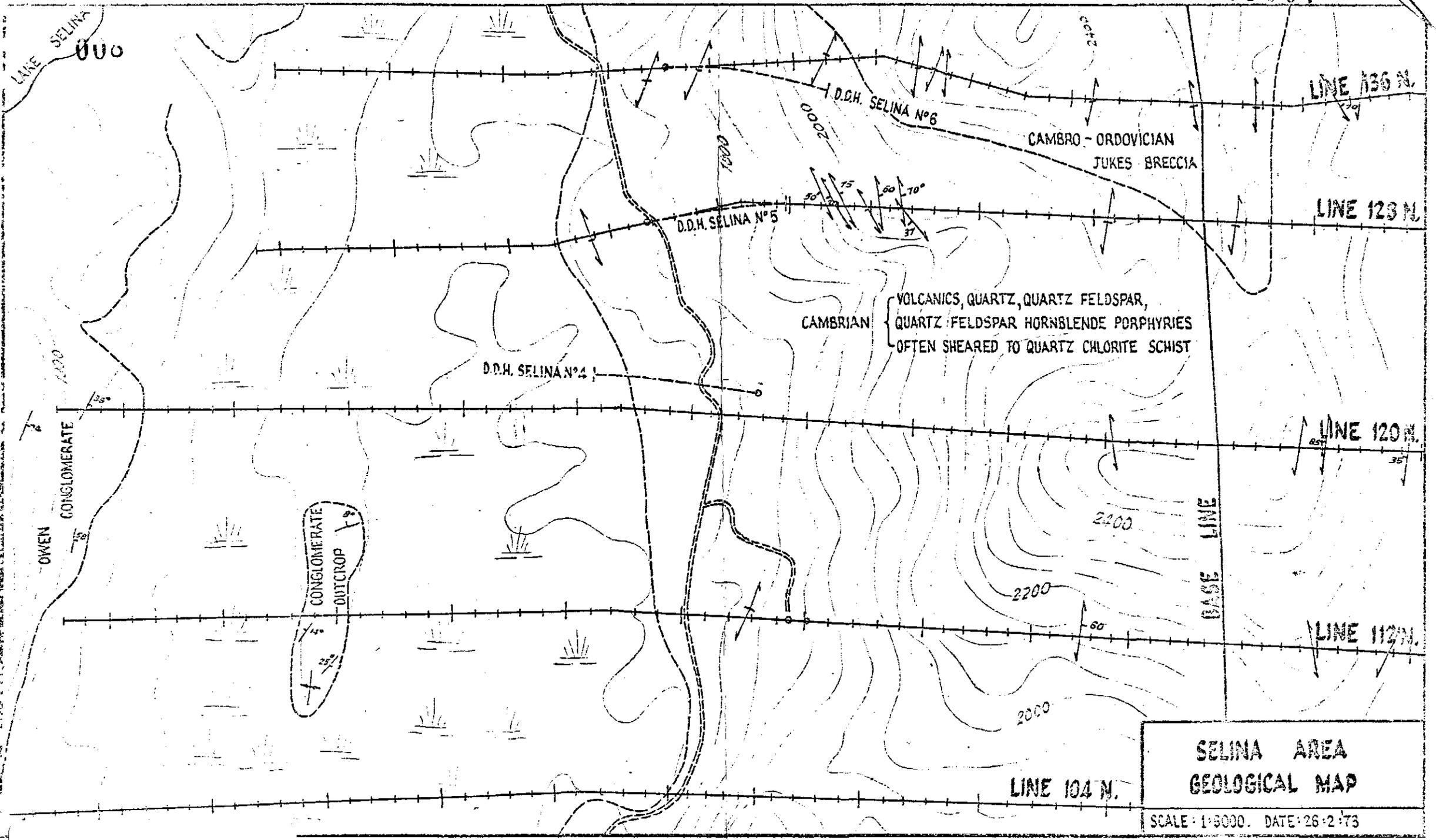
The recognition that high Co in pyrites is an indication that Cu has been in the system continues to make Selina an interesting prospect.

Obviously more work is required to understand the physiochemical factors operating. A detailed look at the mineralogy, some probe work to define more clearly the trace element variation, and spectral studies on the Mn in the chlorites are avenues of further research. This work can be dovetailed into the detailed mapping and trace element study of the pyrite-chalcopyrite mineralisation of the Prince Lyell ore zone (830' level) currently being undertaken. Further interpretation of Selina will depend upon this Prince Lyell study.


J.L. Walshe
21st February, 1973

Maps:

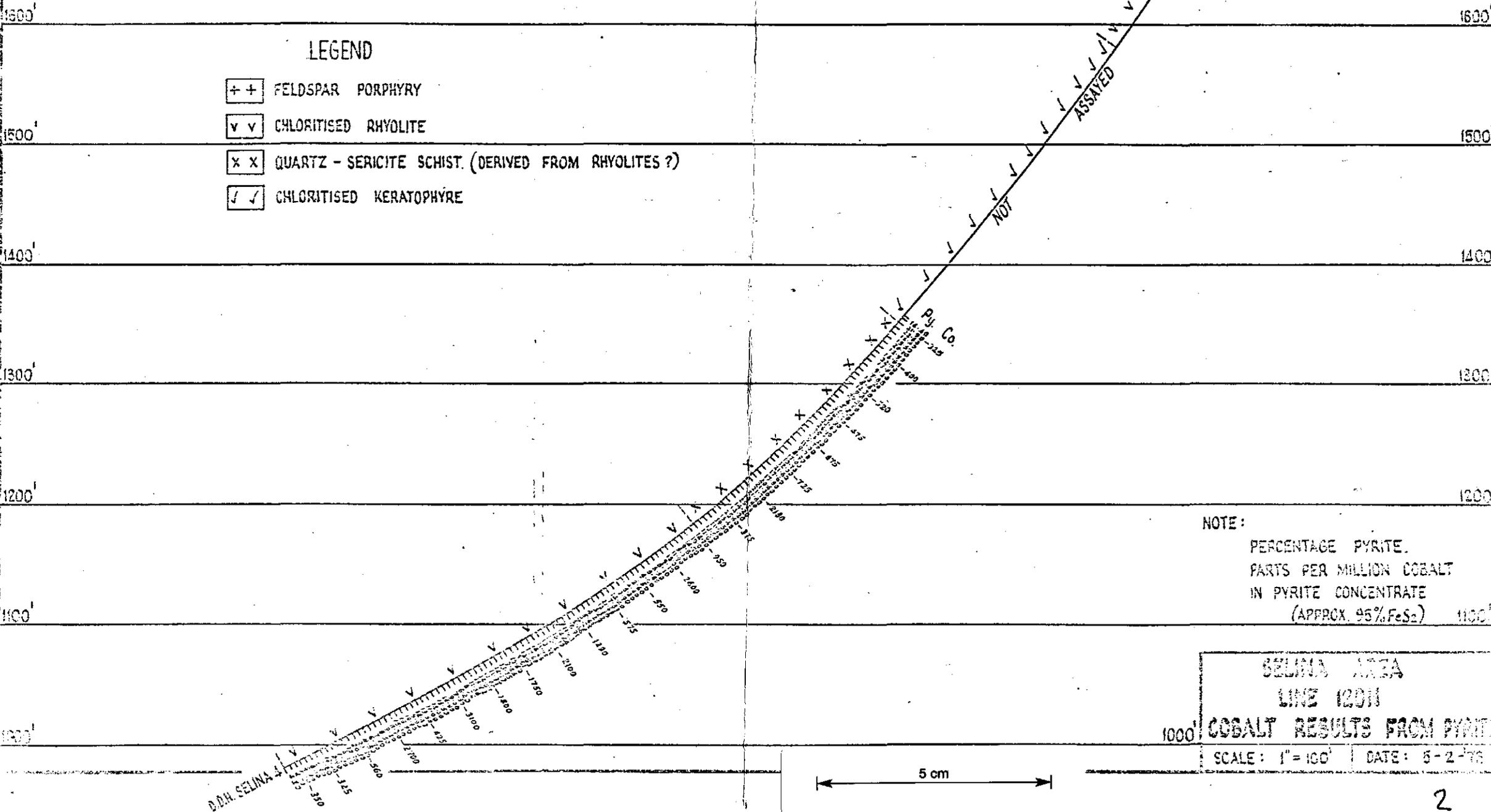
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|----|---------------|----------------|
| 1. | Selina Area - | Geological map |
| 2. | ✓ ✓ - | Line 120 N |
| 3. | ✓ ✓ - | ✓ 128 N |
| 4. | ✓ ✓ - | ✓ 135 N |



**SELINA AREA
GEOLOGICAL MAP**
SCALE: 1:3000. DATE: 26-2-73

5 cm

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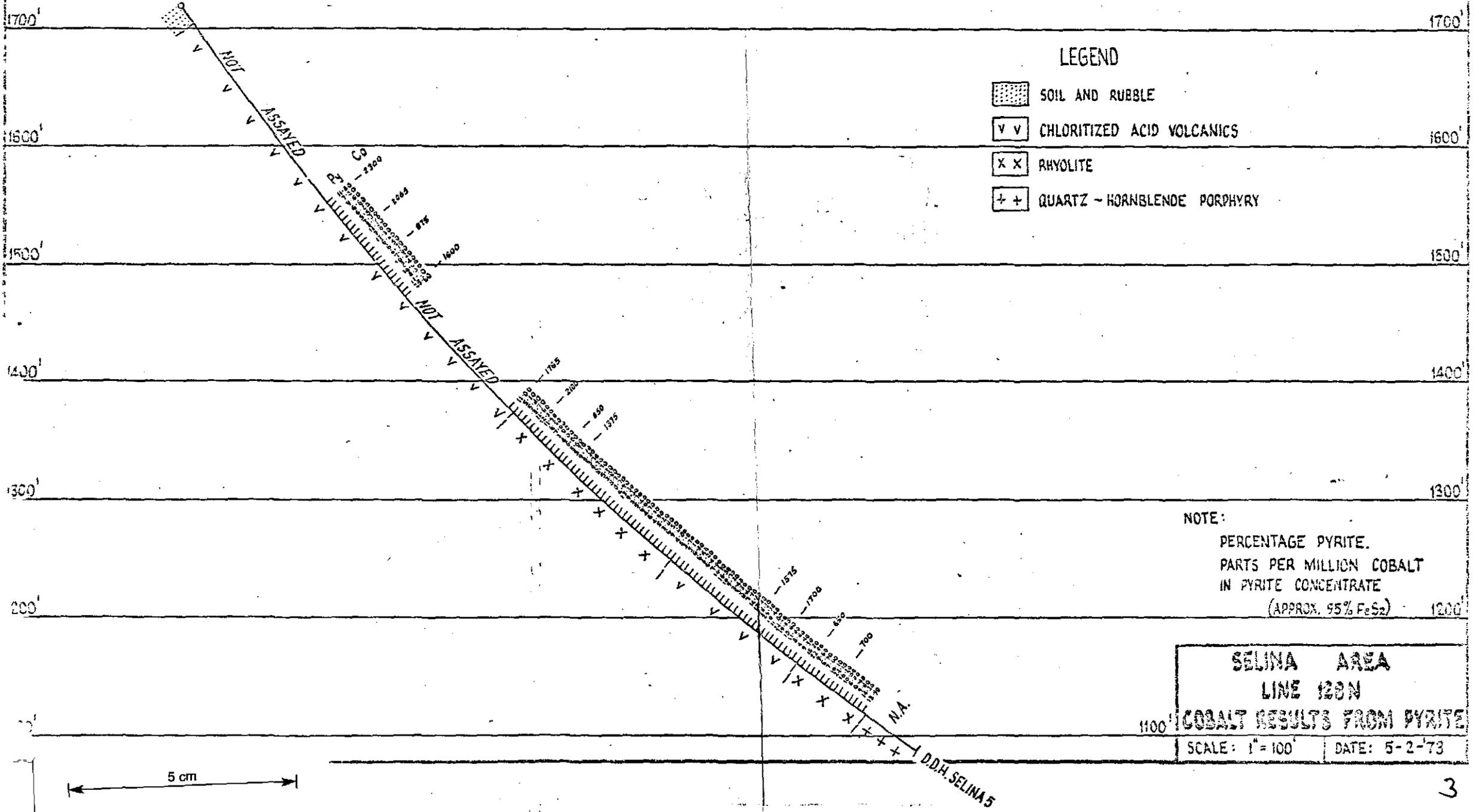
- LEGEND
- ++ FELDSPAR PORPHYRY
 - v v CHLORITISED RHYOLITE
 - x x QUARTZ - SERICITE SCHIST. (DERIVED FROM RHYOLITES ?)
 - / / CHLORITISED KERATOPHYRE

NOTE:
 PERCENTAGE PYRITE.
 PARTS PER MILLION COBALT
 IN PYRITE CONCENTRATE
 (APPROX. 95% FeS₂)

SELINA AREA
 LINE 12011
 COBALT RESULTS FROM PYRITE
 SCALE: 1"=100' DATE: 5-2-75

5 cm

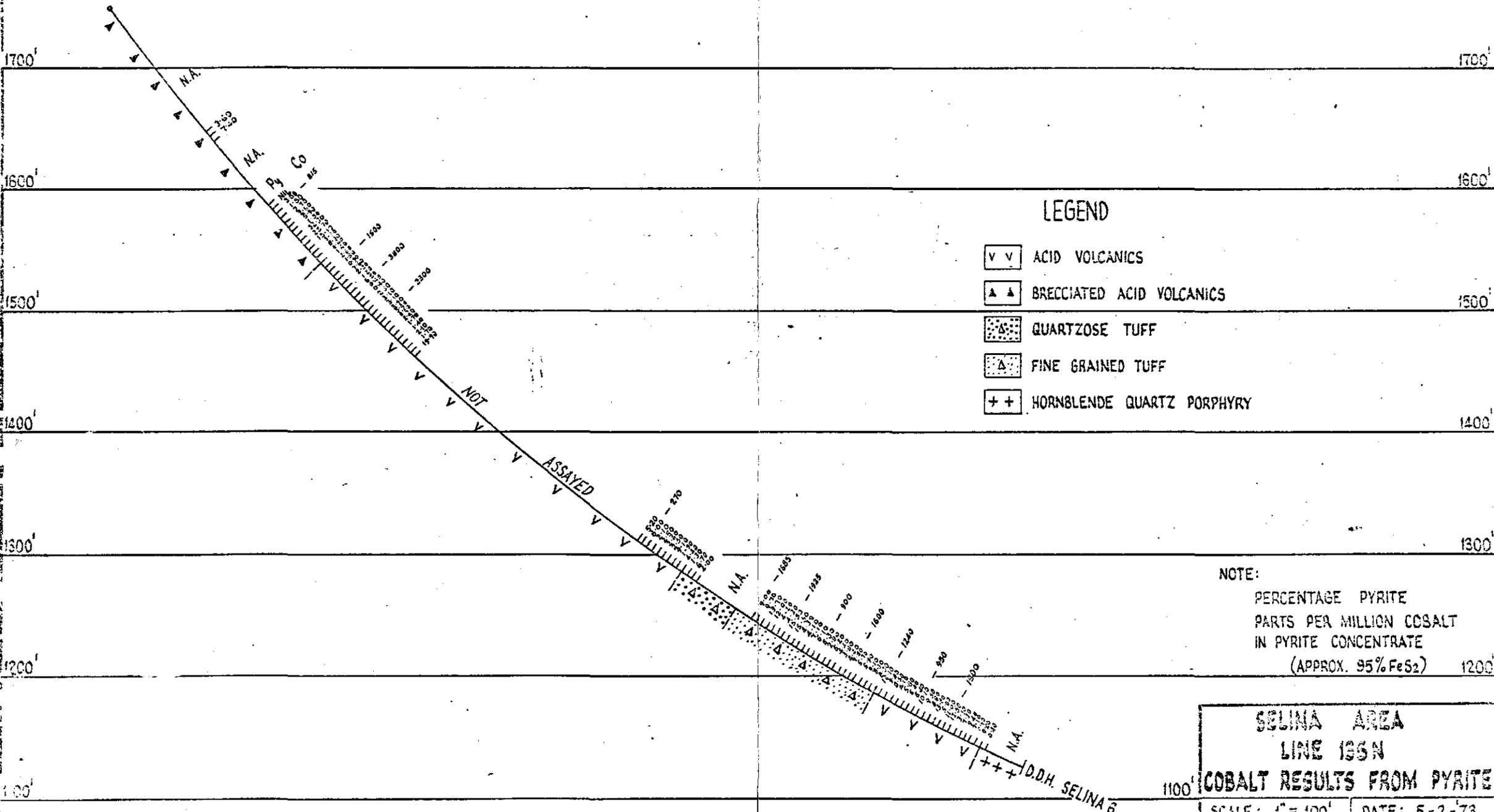
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569010

5 cm



LEGEND

- V V ACID VOLCANICS
- ▲ ▲ BRECCIATED ACID VOLCANICS
- ● ● ● QUARTZOSE TUFF
- FINE GRAINED TUFF
- + + HORNBLLENDE QUARTZ PORPHYRY

NOTE:
 PERCENTAGE PYRITE
 PARTS PER MILLION COBALT
 IN PYRITE CONCENTRATE
 (APPROX. 95% FeS₂)

SELINA AREA
 LINE 135 N
 COBALT RESULTS FROM PYRITE

SCALE: 1" = 100' DATE: 5-2-73