

MEMORANDUM

RESTRICTED

Box 1767,
Whitehorse, Y.T., August 4, 1969.
M.I. M-252

Mining Recorder,
Mayo, Y.T.

Re: Report on Silver Spring Mines Ltd.
Geological, Geophysical & Geochemical
Surveys on the SPRING and SILVER CLAIMS
by P. H. Sevensma

This report is approved for \$5,000.00 for the technical work performed.

You are responsible for the acceptance of the physical work performed.

Attach.
J. C. Torrington:ram

for

J. C. Torrington,
N. O. Needham,
Resident Mining Engineer.

Original Signed By:
J.C. TORRINGTON

cc: Chief, Oil and Mineral Division
Attention: Geological Evaluation Unit

Central Mining Records - Whitehorse ✓

Resident Geologist

MEMORANDUM

RESTRICTED

Mining Recorder,
Mayo, Y.T.

Box 1767,
Whitehorse, Y.T., August 4, 1969.
M.I. M-252

Dear Sir:

Geological, Geophysical and Geochemical Report
on SILVER and SPRING Claim Groups
for Silver Spring Mines Limited
by P. H. Sevensma, Ph.D., P. Eng.

On the recommendation of the Resident Geologist and the Mining Inspector I hereby authorize you to accept this report as representation work under Section 53 (4) of the Yukon Quartz Mining Act to the value of Five Thousand Dollars (\$5,000.00).

Yours sincerely,

Attach.
J. C. Torrington:ram

James Smith,
Commissioner.

cc: Chief, Oil and Mineral Division
Attention: Geological Evaluation Unit
Central Mining Records - Whitehorse ✓
Resident Geologist



LIST of PERSONNEL EMPLOYED in
GEOCHEMICAL and GEOPHYSICAL
WORK PROGRAMS on the SILVER -
SPRING CLAIM GROUP, MAYO M.D.

May 1 to November 14, 1968.

Consulting Services, Field Supervision and Studies:

P.H. Sevensma Consultants Ltd.	-	P.H. Sevensma Ph.D., P.Eng.
715-850 West Hastings Street,		D. Goodbrand, Geologist
Vancouver, B.C.		H.S. Aikins, Technician
		B.C. Fulcher, Student Assistant
		K. Landry, Student Assistant

Evaluation of Geophysical Data:

John S. Brock Limited	-	John S. Brock, Geophysicist
328-355 Burrard Street,		
Vancouver, B.C.		

Linecutting, Soil Sampling, Project Management:

Silver Spring Mines Ltd.,	-	J. Strebchuk, Project Manager,
P.O. Box 62,		P. Westman, Technician
Mayo, Yukon.		W. Strebchuk, Linecutter

DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT

Northern Mineral Exploration Program

- Note: 1. This sheet must accompany the application for assistance.
 2. It must be completed anew at the conclusion of the approved exploration program to show actual expenditures, and is to be submitted under oath with the request for grant payment.
 3. "Units" refers to units of performance such as feet of drilling, line miles of surveys, hours of flying time, etc.

Property <u>Silver & Spring Group Mineral Claims</u>	Claim Sheet No. <u>105-D-3</u>
Name of Company <u>Silver Springs Mines Ltd. (N.P.L.)</u>	Lat. <u>64° 02' N.</u> Long. <u>135° 20' W</u>

Program to be carried out between June 1st, 1968 and September 30th, 1968

Mining Exploration Program	ESTIMATED		ACTUAL		Inspection Field Check
	Units	Expenditure	Units	Expenditure	
1. (a) Consultants Fees		\$ 450.	(1)	\$1,886.33	
(b) Field Supervision		300.			
2. Mobilization and Demobilization of Program					
(a) Transportation		300.			
(b) Freight					
(c) Road Construction					
3. Exploration Work					
(a) Mapping & Prospecting		500.			
(b) Surveys					
(i) Geological		250.			
(ii) Geophysical		500.	3 line miles - dual frequency	650.00	
(iii) Geochemical		750.	(100 samples 300 determinations	750.00	
(iv) Evaluation		1,750.	50 hours, D-8 bulldozer	3,059.55	
(c) Trenching				2,000.00	
(d) Dia. Drilling-(surface)					
(e) Shaft Sinking					
(f) Underground Expl.....					
(i) Drifts & Crosscuts					
(ii) Raising					
(iii) Dia. Drilling					
(iv) Servicing					
		4,800.		8,345.88	

Note (1) - Includes expenditures paid by Consultant for supplies, transportation, etc., and geophysical and geochemical services.

Mining Exploration Program	ESTIMATED		ACTUAL		Inspection Field Check
	Units	Expenditure	Units	Expenditure	
4. Miscellaneous sampling and Assays.		\$ 100.		\$ 214.00	
5. Camp Construction				87.50	
6. Camp Operation					
(a) Supplies		500.		620.00	
(b) Heating					
(c) Maintenance		100.		950.00	
7. Rental of Equipment				150.00	
8. Depreciation				75.00	
9. Major Transportation for Field Support or Service					
(i) Fixed Wing Aircraft					
(ii) Rotary Wing Aircraft					
10. Communications				70.65	
11. Other					
12. General and Administrative Expenses (includes head office and field office administration; attach list of details).			Administration - Travel Office	250.00 4.19	
TOTAL		5,500.		10,767.22	

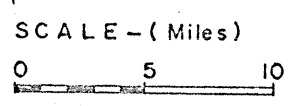
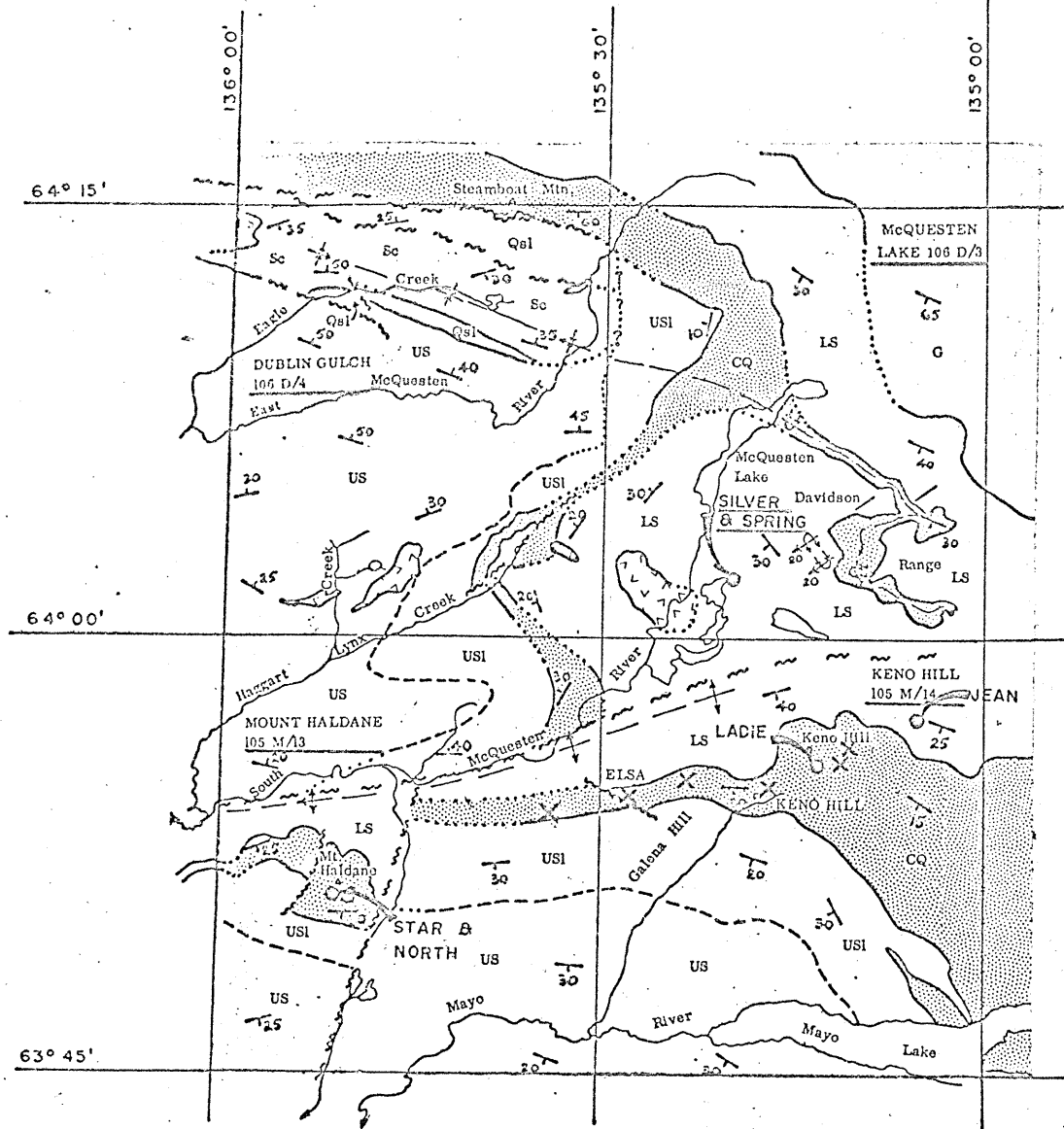
Certified that \$10,767.22 have been expended on the Silver and Spring Group Mineral Claims for the period June 1, 1968 to September 30, 1968.

J. McDiarmid
**J. McDiarmid,
 President,
 Silver Spring Mines Ltd. (N.P.L.)**

Date *April 25th 1969.*

Signed in the presence of

[Signature]
 1272 *[illegible]*
 Victoria B.C.
 Civil Servant



LEGEND

- Sc Slate, chert; quartzite, limestone
- Qsl Quartzite, slate, limestone
- US Upper Schist: schist, quartzite, grit;
USI, lower part includes limestone
- CQ Central Quartzite: thick-bedded quartzite.
- LS Lower Schist: schist, phyllite
- G Grit unit: quartzite, slate, grit, limestone
- ▲▲▲ Granodiorite
- ↖ Dominant foliation
- X Operating mines of United Keno Hill Mines Ltd

P. H. Sevensma

SILVER SPRING MINES LTD.	
<i>LOCATION MAP</i>	
Mayo M.D.-Y.T.	
P. H. Sevensma Consultants Ltd.	March 1968

SILVER SPRING MINES LTD.
Silver and Spring Claim Groups
Lat. 64° 02'N., Long. 135° 20'W.
Mayo M.D., Yukon Territory

SUMMARY REPORT

Geological
Geophysical
and
Geochemical

work programs conducted
during the period May 1,
1968 to November 14, 1968.

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

November 14, 1968.

This report has been examined by
the Geological Evaluation Unit.
Approved as to technical worth by:

A. B. Craig
RESIDENT GEOLOGIST

Approved as to cost in the amount
of: \$ 5,000.00

R. E. Pether
RESIDENT MINING ENGINEER

Accepted as representation work
under Section 53(4) Yukon Quartz
Mining Act.

[Signature]
COMMISSIONER OF YUKON

TABLE OF CONTENTS

	<u>Page No.</u>
1. INTRODUCTION	1
2. PROPERTY	1
3. PHYSICAL WORK	2
4. GEOPHYSICAL SURVEYS	3
5. GEOCHEMICAL SURVEYS	3 - 5
6. SUMMARY	5
7. RECOMMENDATIONS	5 & 6

FIGURES

- Fig. 1. Soil Samples, Zinc Plot (1" = 200')
2. " " Lead Plot (1" = 200')
3. " " Copper Plot (1" = 200')
4. " " Arsenic Plot (1" = 200')
5. EM Survey, Profiles - station NPG
6. " " Profiles - station NPM
7. " " Conductor Response

APPENDICIES

- * APPENDIX "A" - "Preliminary Report" Silver & Spring Claim Groups
- APPENDIX "B" - Geophysical Report - John S. Brock

* Revised Geological and Claim Maps included

SILVER SPRING MINES LTD.
Silver and Spring Claim Groups
Lat. 64° 02'N., Long. 135° 20'W.
Mayo M.D., Yukon Territory

1. INTRODUCTION

During the period between June and September of 1968, Silver Spring Mines Ltd. conducted a program of exploration work on the Silver-Spring claim group.

Field operations were managed by Mr. J. Strebchuk, a director of the company well versed in the operating problems unique to this area of the Yukon. A well equipped trailer camp provided a convenient base for work on this and other mineral claim holdings of the company. Work was staged to take maximum advantage of the relatively short field season.

2. PROPERTY

The twelve original claims on this group were increased to 38 full size claims and two fractional claims. Claims covering the area in which work was performed were surveyed by chain and compass and are plotted on the various maps prepared. It is understood that all claims were staked or acquired by or for the company and have now been transferred to the company. All claims appear on claim map 105-D-3, McQuesten Lake, and are recorded as follows:

<u>Claim Name</u>	<u>Grant No's.</u>	<u>Renewal Date</u>
Silver No. 1 - 8	83758 to 83765 incl.	November 9, 1969
Silver No. 9-- 16	Y14950 to Y14957 incl.	June 12, 1969
Silver No. 17 - 24	Y14990 to Y14997 incl.	June 13, 1969
Spring No. 1 - 4	Y6575 to Y6578 incl.	November 9, 1969
Spring No. 5 - 12	Y14942 to Y 14949 incl.	June 12, 1969
Spring Fraction No. 1	Y26614 J	July 23, 1969
Spring Fraction No. 2	Y26615	July 23, 1969
Spring No. 13-- 14	Y26616 to Y26617 incl.	July 23, 1969

3. PHYSICAL WORK (line cutting and bulldozer operations)

24,200 feet of survey line were hand cut and picketed at 100 foot intervals to provide control for subsequent work.

A substantial amount of two wheel drive road was constructed on the property by other interests developing a mining property to the north of this claim group. This road proved of value in providing improved accessibility and in the exposures of mineral soil and bedrock occurring in all the cuts. No costs to Silver Spring Mines Ltd. were incurred by this work.

A D8H bulldozer was employed in the later part of June and early July to strip and trench areas where initial geochemical results has suggested significant metal concentrations in the soil. It should be noted that the presence of perma frost under an insulating layer of muskeg and organic "muck" precluded the practical trenching of any area unless sufficient time for thawing was allowed. A number of areas, as shown on the attached geochemical maps, were stripped and several trenches were completed to bedrock. One deep trench on an area previously stripped required the excavation of about 2,000 cubic yds. of partially frozen soil and glacial gravel to expose approximately 100 feet of the underlying rock.

Several old trenches and a well constructed cabin located just off the grid to the east of line 12+00N were located during the course of the current work, but no mineralization of interest was found in the old workings.

Sub-angular float fragments carrying minor amounts of pyrite, siderite, arsenopyrite and chalcopyrite were located at several points in the general vicinity of the base-line and line 4+00 north.

4. GEOPHYSICAL SURVEYS

A separate report, attached as Appendix A, by John S. Brock, dated October 31, 1968, summarizes the results of an EM 16 survey conducted over part of the claim group. It will be noted that low frequency, horizontal loop, EM surveys would be required to further evaluate the conductive zones detected by this method.

Plots of the in-phase and quadrature response at all stations and for both frequencies are enclosed together with an interpretive plot of strong and weak conductors.

5. GEOCHEMICAL SURVEYS

(a) Method and analytical procedures

Prior to the commencement of the field program, a review of pertinent data was incorporated in a report dated May 22, 1968, prepared under my supervision. This report is attached as Appendix B. Maps accompanying this report were revised to incorporate changes resulting from the season's activity and will be found with the present text in revised form.

The geochemical program was initiated by selecting soil samples from various depths and soil types up slope from the gossan zone. This work suggested a strong lateral zoning influenced only to a limited extent by the other variables. Based on these results a more extensive grid controlled survey was conducted. Some difficulty with perma frost was encountered which resulted in mixing of organic and mineral soils in many of the samples. Estimates on the organic content, which varied from 15 to 50%, showed no direct relationship to heavy metal

content. It was however, noted that where samples high in organic matter were ignited to 600° C and digested in chlorate mix, a higher copper value was obtained. Results used in the distribution maps were based on analytical results from the Whitehorse Assay Office which employed perchloric acid digestion and Atomic Absorbtion analysis. Arsenic analyses was performed by Coast Eldridge Professional Services Division of Vancouver, B.C. after preparation by the Whitehorse Assay Office. A total extraction method was used for arsenic.

(b) Results

Results were recorded on maps drawn to a scale of 1" = 200'. Examination of these results revealed a degree of coincidence between the highest lead, zinc and copper values. In general, the peak values for these metals were below levels expected in close proximity to vein deposits. The high threshold values do suggest that a major source could be located somewhere in the general area. No definite pattern could be drawn from silver results and analyses for this element were discontinued. Arsenic was employed as a "pathfinder element" for silver-gold veins. The anomalous trend revealed by this element outlined a zone adjacent to a small porphyry dyke. Arsenopyrtie was observed in an irregular quartz vein within the porphyry mass at a point near station 7+00E on line 4+00N. Assays from this vein and the adjacent host rock were reported as follows on Whitehorse Assay Office Certificate #4525-3:-

<u>Sample No.</u>	<u>Au</u>	<u>oz/t. Ag</u>	<u>% Pb</u>	<u>% Cu</u>	<u>Description</u>
14152	Tr.	1.44	Tr.	-	mineralized vein.
14153	Tr.	.14	Tr.	Tr.	wall rock.
14155	Tr.	.10	-	-	unmineralized vein.

During an examination of this property on July 16, 1968, the writer took three soil samples from selected areas.

The results of this test were as follows:

Number and Description	oz/t.		P.P.M.		P.P.M.	Location
	Au.	Ag.	Cu.	Pb.	Zn.	
60 Soil - 8' deep	Tr.	.32	488	88	600	3+60W, 4+00N
61 Stream silt	Tr.	.32	40	24	168	- 21+50N
62 Clay-gossan	Tr.	.62	28	288	1,000	Gossan N. of road

6. SUMMARY

The extensive gossan zone carrying heavy metal values which first attracted interest to this area has not as yet been satisfactorily explained. That the source lies up slope and to the north is clearly evident. Glacial agencies are however, indicated as having played a role in transporting the source material. Information gained to date does not provide sufficient data for ascribing a positive potential to this area. The favourable geology and positive geochemical results do however, warrant follow-up work on a reconnaissance basis in the area up slope and to the north of the present grid. Stripped areas should be examined and sampled to confirm and extend present trends. Geological mapping should be employed to establish lithologic boundaries.

Encouragement in any of this work would warrant the implementation of a detailed program utilizing horizontal loop EM and ground magnetic surveys.

7. RECOMMENDATIONS

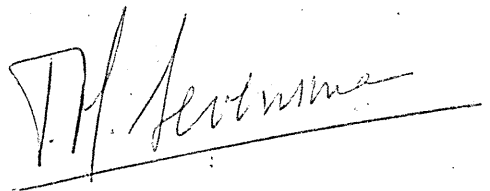
The ease of access and close proximity to other holdings of the company suggest that work be continued on a low priority basis. The following cost estimate is provided as a guide to work conducted in this manner:

Geological Mapping and Prospecting	
5 man days @ \$75.00 per day	\$375.00

Soil and Silt Sampling	
100 samples @ \$5.00 per sample	\$500.00
Geophysical Surveys (see summary)	
5 line miles @ \$150.00 per mile	750.00
Transportation and Accommodation Expense	
15 man days plus truck rental, air-fare, etc.	625.00
Consulting Fees, Expenses	
(Review of data)	250.00
Contingencies at 20%	<u>500.00</u>
Recommended Budget	<u>\$3,000.00</u>

It is suggested that the expenditures of this sum should provide sufficient data on which to reach a decision on the merit of retaining this property.

Respectfully submitted,



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

APPENDIX "A"

SILVER SPRING MINES LTD.

SILVER & SPRING CLAIM GROUPS

Lat. $64^{\circ} 02' N.$, Long. $135^{\circ} 20' W.$

Mayo M.D., Yukon Territory

Prepared by H. S. Aikins

Under the Direction of P.H. Sevensma, Ph.D., P.Eng.

P. H. SEVENSMA CONSULTANTS LTD.

May 22, 1968

TABLE OF CONTENTS

LOCATION	Page 1.
PROPERTY	Page 1.
CLIMATE and TOPOGRAPHY	Page 1.
SURFICIAL GEOLOGY	Page 1.
GEOLOGY	Page 2.
GEOCHEMISTRY	Page 2.
A. Soil Type	Page 3.
B. Major Constituent Elements as Indicators	Page 4.
C. Minor Elements as Indicators	Page 5.
SUMMARY	Page 5.
RECOMMENDATIONS	Page 6.

LIST OF FIGURES*

Geological Plan	1" = $\frac{1}{2}$ Mi.	Fig. 1.
Stream Sediment Sampling		Fig. 2.
Claim Map	1" = $\frac{1}{2}$ Mi.	Fig. 3.

*Revised and up-dated to November 1968.

LOCATION

The twelve claims comprising this group are located north-east of Hanson Lake and extend up the west flank of Forbes Hill in the Davidson range. The property lies some nine miles in a northerly direction from the presently developed properties in the Elsa-Keno Hill camp. A tote road connects the property with the government maintained highways in the area. The Community of Mayo, some 35 miles to the south, serves as the local centre for supplies, communication and transportation.

PROPERTY

Refer to previous report by P.H. Sevensma, April 4, 1968.

CLIMATE AND TOPOGRAPHY

While the year round climate is best described as rigorous the nearly continuous daylight during the short, warm summer provides an excellent environment for mineral exploration activities. Rainfall is moderate.

The irregular presence of permafrost, the prevalence of glacial till and debris, and the immature soil development and presence of "black muck" of largely organic origin are factors which greatly influence the effectiveness of exploration methods employed.

SURFICIAL GEOLOGY

Fig. 1, derived from Map 1172A accompanying G.S.C. Bulletin 136, shows the principal features which should receive consideration in the further study of this area. It is noted that the valley floor is heavily drift covered and that partially reworked

Glacial deposits extend up slope to almost 3000 ft. elevation in the vicinity of the claim group. Layers of till, sand and gravel of variable thickness, deposited by the retreating valley glacier extend to the lateral moraine shown near the 4000 foot contour.

GEOLOGY

Regional mapping by the Geological survey indicates the area to be underlain by schists, thin-bedded quartzites, and phyllites of the "lower schist formation". Three occurrences of "greenstone" occur on, or adjacent to, the claim group. The present owners report a limonitic gossan zone 200 feet wide by 1,500 feet long presumably near the spring indicated as location 2 on figure 2. Assays from this material by the owners returned values of .5 oz. Au./T, and .5 oz. Ag./T. Attention is also drawn to the presence of old claim posts and cabins suggesting prospecting activities and possibly old workings as yet unlocated.

GEOCHEMISTRY

The geochemistry, and the significance of stream silt sampling results, in the vicinity of the lead-zinc-silver deposits of the Keno hill area has received much attention from members of the Geological Survey of Canada. Frequent reference has been made to data obtained in field and laboratory studies and to conclusions and recommendations by the authors of these studies.

With reference to iron springs, Boyle states on page 186 of Bulletin III:-

"If the geochemical prospector finds iron springs in an area he should carefully consider the topographic location of the springs and the possible sources of the contained metals. In some places iron springs are closely related to lodes and are, therefore, good indicators; in other places the springs may lie some distance, generally downhill, from the lodes. In the latter, the water carrying the metal has entered mineralized zones and lodes at higher elevations and has migrated downhill along underground fractures and faults. Furthermore, the fractures and faults from which the springs issue may not be the ones containing the lodes but may be subsidiary faults or fractures or post-ore faults. There may be two sources for the zinc and other metals in the springs. The metal is derived either from oxidation of lodes or from the oxidation of sulphides scattered in the country rock or along sparsely mineralized faults and fractures. There is no way of determining which source is the main contributor. From the research carried out on the iron springs in the Keno Hill-Galena Hill area it would appear that those carrying a high manganese content and a concentration of zinc in excess of 0.05 ppm derive their zinc and manganese mainly from siderite-galena-sphalerite lodes or mineralized zones. This may not always be so, and areas around all iron springs or conglomerates should be carefully prospected, especially if the water or the material precipitated contains detectable amounts of zinc, copper, or other metals."

General observations on the behavior of the heavy metals may be summarized as follows:-

A. Soil Type

Both residual soils, overlying the rocks from which they were derived, or transported downslope by soil creep, and transported soils -

glacial till and fluvial sands and gravel - may occur over the area of interest. Low-lying, poorly drained ground and north slopes carry a cover of black organic muck. The soils exhibit a poor profile development, particularly when underlain by permafrost. In many areas the profile has been disturbed by frost boiling and solifluction. The mucks are shown to have a high absorption capacity for zinc & copper, and silver when overlying glacial till.

B. Major Constituent Elements as Indicators.

- (1) Copper: Not generally suitable due to its low average content in the lode deposits and low mobility in the ground water system where conditions of neutral or alkaline Ph. prevail. Copper values may however be significant adjacent to gossan zones where more acid conditions would prevail.
- (2) Zinc: Much zinc derived from vein zones has been dispersed into the ground water system and due to its high relative mobility may be located at some distance from the source. Careful examination of the dispersion pattern of this element is essential.
- (3) Lead: Very little lead is dispersed into the ground water system, whereas soils adjacent to oxidized sulphide zones show a marked enrichment in lead. The upward migration of lead ions is impeded by glacial till and samples should be taken from the greatest possible depth in soil of this type. Lead is an excellent indicator for the location of vein deposits.
- (4) Silver: From a prospecting viewpoint silver behaves in a manner similar to lead and should be employed in the same manner as lead.

C. Minor Elements as Indicators

Both arsenic and antimony content may be used to indicate the presence of veins and well defined anomalies slightly offset, downslope, are clearly shown by test traverses. Manganese provides a less definite indicator with anomalous values generally about 200% of background. Cadmium content is too low to be of practical use in a soil survey of this type.

SUMMARY

Results of stream sediment sampling by the G.S.C. as shown in Fig. 2 are of interest when viewed in terms of the possible significance of an extensive gossan zone developing from the oxidation of an underlying vein zone. The depth and nature of the surficial deposits is clearly a significant factor in attempting to define the source of metals occurring in the ground water system.

The underlying schists are not regarded as a favourable host for deposits of commercial size in the Galena Hill-Keno Hill belt but as a somewhat different tectonic pattern may prevail in this area the possibility of workable deposit occurring in this area cannot be eliminated.

The reported gold values are of considerable interest and tend to suggest the possibility of Quartz-Arsenopyrite-Gold vein structures related to the granodiorites as found in Dublin Gulch and on Keno and Galena Hills. Arsenic values in the stream sediment samples tend to confirm this hypothesis.

RECOMMENDATIONS

It is suggested that a base line parallel to the surface contours be cut at a point above the gossan zone and extending over the length of the existing claim block. Grid lines at 400' intervals should be turned off at right angles and extended down and across the melt water channel. The lines could be extended up slope for a distance of at least 2000 feet. Pickets should be located at 100' intervals.

Careful prospecting within this area should be conducted to establish areas of outcrop and to locate angular float brought up by frost action.

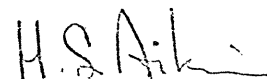
An orientation soil sampling program on the periphery of the gossan zone and from selected locations up slope should be conducted to evaluate the effectiveness of this tool in further work and to confirm the earlier results.

Favourable results in the above work would necessitate a comprehensive soil sampling program to detail anomalies. Geophysical methods should be considered if a lead-zinc-silver occurrence is inferred.

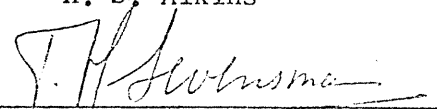
Bulldozer trenching may be warranted at any stage after general target areas have been defined.

The program should be reviewed after an initial expenditure of the \$3,000;00 specified in the previous report.

Respectfully submitted,



H. S. Aikins



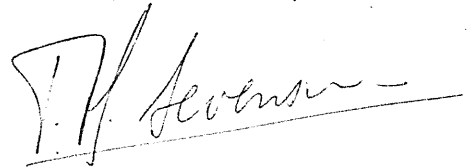
P. H. Sevensma, Ph.D., P.Eng.

CERTIFICATE

I, PETER H. SEVENSMA, of Vancouver, B. C. do hereby certify that:

1. I am a graduate of the University of Geneva, Switzerland, (Physics and Chemistry, 1937; Geology and Mineralogy, 1937) where I obtained my Ph.D. in Geological and Mineralogical Sciences in 1941.
2. I am a Consulting Engineer and a registered member in good standing of the Association of Professional Engineers of British Columbia and of the Association of Professional Engineers of Yukon Territory.
3. From February 1948 until December 1965, I have been engaged continuously in mining and exploration geology in the employ of Cominco Limited. As a Senior Exploration Geologist, I have worked extensively both in Eastern and Western Canada.
4. I personally examined the property referred to in this report on July 16, 1968, and am well acquainted with a number of nearby properties within the Mayo camp, including the operating mines.
5. I have not received, nor do I expect to receive or acquire, directly or indirectly, any interest in any of the properties or securities of Silver Spring Mines Ltd.

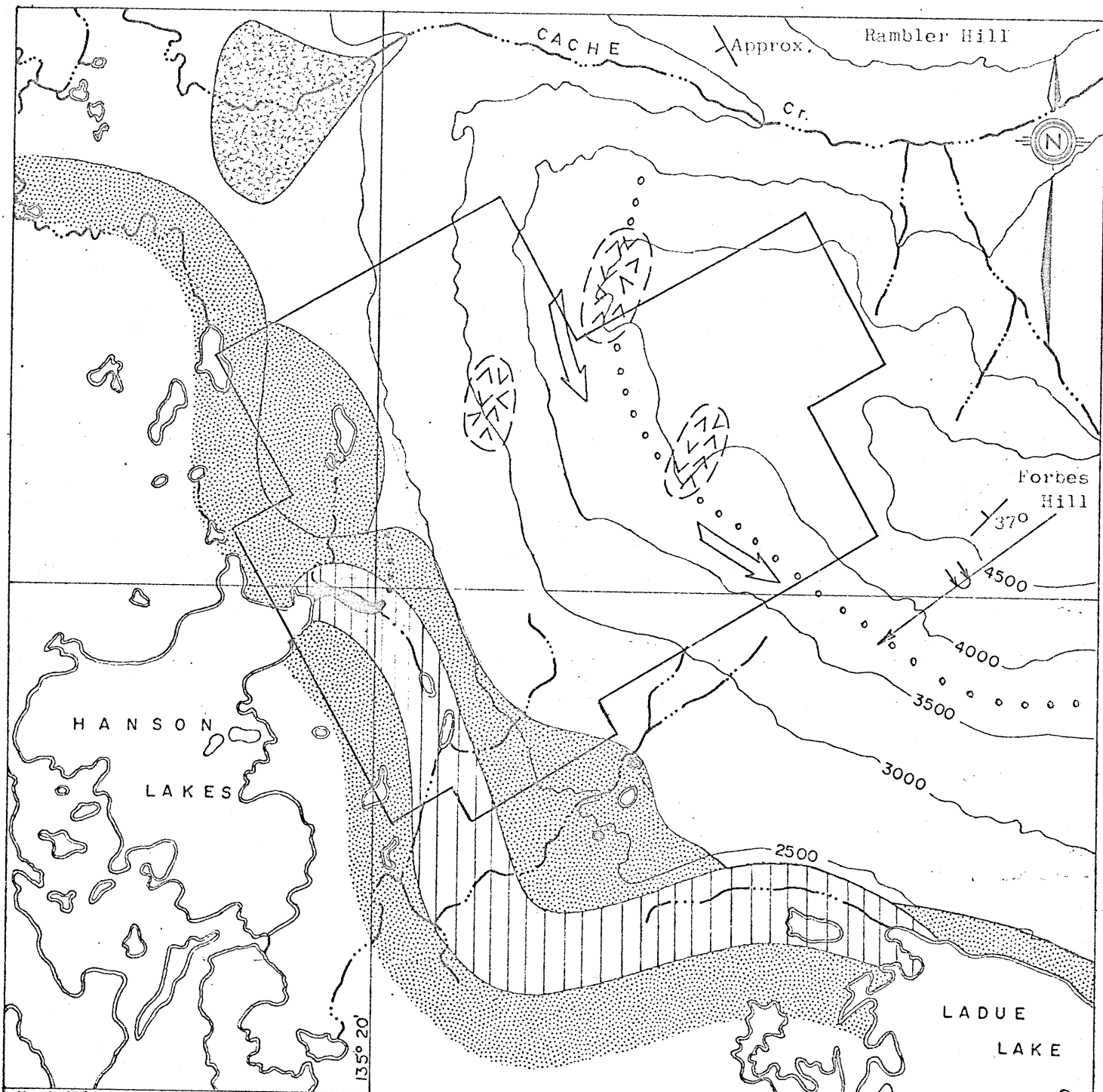
Respectfully submitted,



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

PHS/dk

November 14, 1968.
Vancouver, B. C.



Bed Rock Geology

Meta-Diorite, meta-gabbro (Greenstone) $\boxed{\wedge \lt \vee \gt}$

Graphitic schist, tb. qtzite, qtz-mica schist
 Phyllite, calc-schist and qtzite
 (lower schist formation)

W. Johnston

Surficial Geology

- Direction of Ice Flow
- Meltwater Channel
- Glacio-fluvial dep.
- Alluvial fan
- Lateral Moraines
- Transported Boulders

Ref. Geology G.S.C. Bulletin III
 Surficial Geol.: G.S.C. Bulletin 126

Revised November, 1968.

Scale — (Miles)

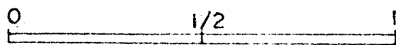


FIG. 1

SILVER SPRING MINES LTD

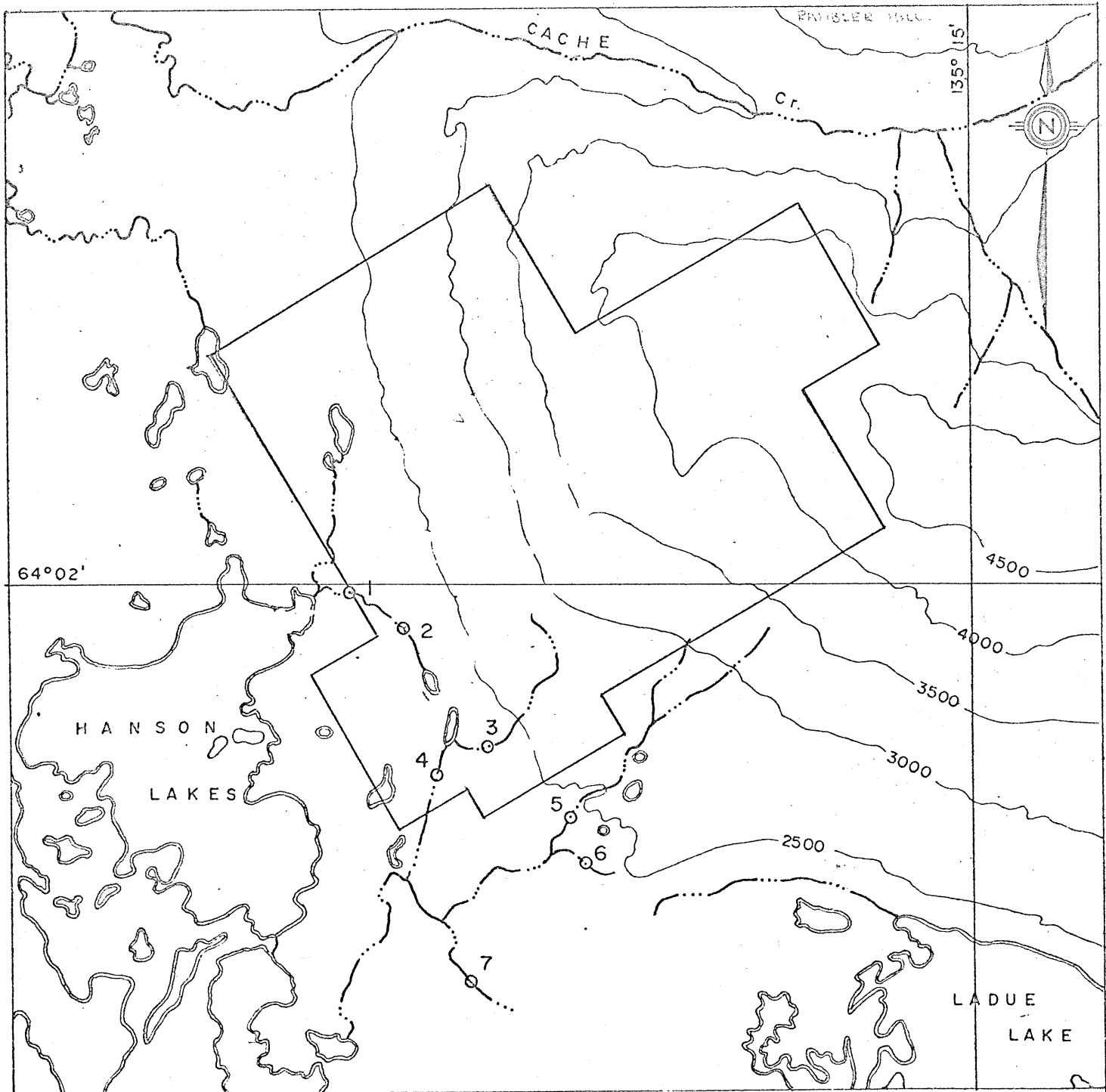
Geological Plan

Mayo M.D.—Y.T.

106-D-3

P.H. Sevensma Consultants Ltd.

March 1968

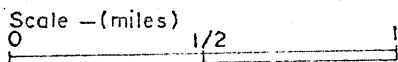


Values in p.p.m. in
Stream and Spring Sediments

	As.	Ag.	Cu.	Pb.	Zn.	Sb.	Mo.
1	24	*	-	5	310	2.5	~
2	2	*	-	x	1000	+	~
3	16	*	-	5	130	2.5	~
4	24	*	-	5	110	2.5	~
5	2	*	-	x	70	2.5	~
6	2	*	-	5	100	2.5	~
7	32	*	-	10	120	2.5	~

~ Concentration less than 1.0 p.p.m.
 * " " " 0.5 p.p.m.
 x " " " 5.0 p.p.m.
 + " " " 2.5 p.p.m.

Ref: Spring & Stream Sediment Study
 Xeno Hill Area, C.F. Gleason.



P.H. Sevensma

Claim boundaries revised November, 1968.

SILVER SPRING MINES LTD

STREAM SEDIMENT SAMPLING

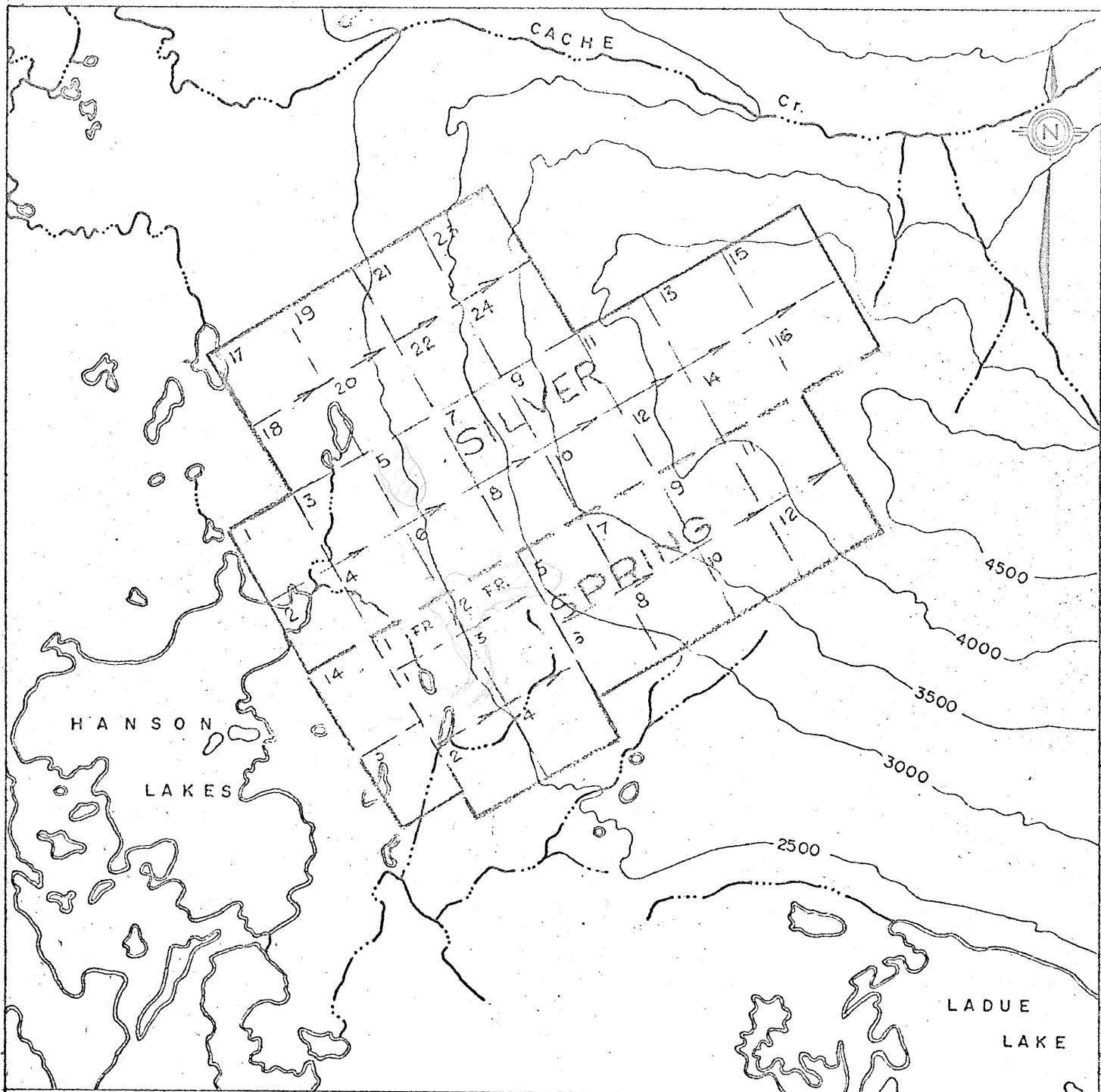
Mayo M.D. - Y.T.

105-D-3

P.H. Sevensma Consultants Ltd.

March 1968

FIG. 2



P. H. Sevensma

Scale — (Miles)

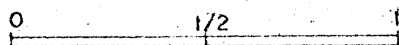


FIG. 3

SILVER SPRING MINES LTD

CLAIM MAP — SILVER & SPRING
 Mayo M.D. — Y.T. 106-D-3

P. H. Sevensma Consultants Ltd.

Oct. 1968,

APPENDIX "B"

GEOPHYSICAL REPORT

EM 16 (VLF-EM) ELECTROMAGNETIC SURVEY

SILVER AND SPRING
MINERAL CLAIMS

N.T.S. 105-M

Yukon Territory

By

JOHN S. BROCK

October 31, 1968

INTRODUCTION

A Ronka EM 16 electromagnetic survey was conducted over the Silver and Spring Mineral Claims of Silver Spring Mines Ltd. during June 1968. In conjunction with an exploration and development program consisting of geologic mapping, geochemical surveys and bulldozer trenching; 14,300 ft. of electromagnetic survey was conducted to aid in interpretation of the properties economic potential.

LOCATION AND ACCESS

The Silver and Spring Groups are located in the Yukon Territory, between Elsa and Hansen Lake (N.T.S. 105-M-14). Access to the property may be gained by way of the Hansen Lake Road, an all weather transportation route currently providing access to Foley Silver Mines near Rambler Hills.

SURVEY METHOD

Control Grid

The electromagnetic survey was carried out over a cut line grid controlled by chain and picket methods. The survey grid consisted of a centrally located 2800 ft. baseline bearing N20W. Crosslines of 400 ft. spacing and 100 ft. station intervals were established with crosslines of 200 ft. spacing over areas of prime interest.

Instrumentation

The Ronka EM 16 is a basic electromagnetic tool using homegenous horizontal primary fields in the 15 to 25 kc. range. The high frequency ranges have been adopted for purposes of tracing weak conductors. In the instance of this survey readings were taken on both 18.6 kc. and 23.4 kc. frequencies.

The equipment is operated on the principal that VLF radio stations transmit vertical antenna currents creating a concentric horizontal magnetic field. When the magnetic field crosses conductive subsurface bodies, secondary fields are radiated. The EM 16 measures the vertical components of these secondary fields.

Electromagnetic Survey Method

Two frequencies, 18.6 kc. as transmitted from NPG-Seattle and 23.4 kc. as transmitted from NPM-Hawaii were used for each station read over the survey area. Transmitting stations were selected which gave the field approximately at right angles to the regional strike of geologic structure, signals received from the 18.6 kc. transmitter should be considered as the most reliable for secondary field emission over this area.

All readings were taken facing northwest for 23.4 kc. and southwest for 18.6 kc. Percentage readings of the in-phase and quadrature response were taken for each frequency at each 100 ft. station.

Separate maps on scale 1:200 were prepared of profiles obtained on each of the two frequencies.

RESULTS

It has been assumed from the survey data presented that all lines were run with the instrument oriented in a westerly direction, all polarities are then relative and no correction for orientation have been carried out.

Topography slopes approximately -15 degrees to the west and results have been adjusted accordingly by placing of the 0% reference at -14 degrees for all in-phase profiles. Apparent

variations in overburden thickness and conductivity render quadrature response inadequate for precise interpretation. It is for this reason that in-phase response only has been examined.

Results have been presented for profile study in the appendix (Figures 1 to 10). An attempt has been made to correlate profiles obtained on frequencies 18.6 kc. and 23.4kc. in order that conductor response to both frequencies could be clarified. Usually reading of two frequencies, such as those transmitted from stations NPM and NPG, with orthogonal strike directions, will provide additional information that clarifies the causative structure. In this case only strong conductors have been noted that have response on both frequencies.

Profiles are generally of 'smooth' response and a minimum of 'noise' from conductive overburden and such other sources as graphitic shears has been encountered. To eliminate any interference from such sources, a profile scale of 1 inch vertical to 40% was used.

INTERPRETATION

As all profiles were mapped with the instrument oriented in a westerly direction, it can be assumed that all conductors will be located to the west of any positive in-phase response. A general 'rule of thumb' is that in-phase response will reach positive levels when the conductor is approached. Cross-overs and inflection points west of positive in-phase responses and common to both frequencies have been noted as 'strong' conductors. Cross-overs and inflection points recorded only on 18.6 kc. have been noted as 'weak' conductors. Locations of such may be seen in the appendix. For location reference, axial traces of conductor locations are presented on a grid plan.

Depths of conductors (to upper edge) as determined by 'half widths', are less than 100 ft. from surface.

Inferred traces of conductor axis are north to northwest trending and do not conform with the regional strike of limited geology known. Dips cannot be accurately interpreted from VLF-EM profiles but it is suggested that the conductors are dipping from 45 to 80 degrees in a westerly direction.

On lines 2+00N to 12+00S, positive in-phase response at the western extremities of each line, probably represents conductive overburden; flat profiles east of this point and towards the base line, are characteristic of competent non-conductive rock types such as quartzite. The few conductive traces within this area could be due to graphitic shears or interfaces. The strong conductor shown on lines 0 to 16N (west of baseline) and more specifically from 8 to 16N, is more typical of a conductive shear or mineralized vein zone. It is interesting to note that weak lead geochemical results have been obtained near this zone of conductivity.

CONCLUSIONS

The VLF-EM system is limited by its high frequency and the inability to interpret from the results the conductivity and shape of the conductor. Similar results have been obtained from structures that could either be shear and fault zones as well as mineralized vein-type formations. In order to interpret numerous conductors thus outlined, results from two transmitting stations have been correlated. VLF-EM results may also have been influenced by changes in overburden depth, related fault or shear zones and regional effects from nearby conductive structures.

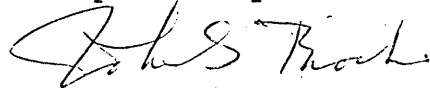
All conductive traces noted as 'strong' conductors are recommended for further follow-up in view of the possibility that they may

represent sulphide bearing vein-type structures, in most cases lead geochemistry appears to be associated with these conductors.

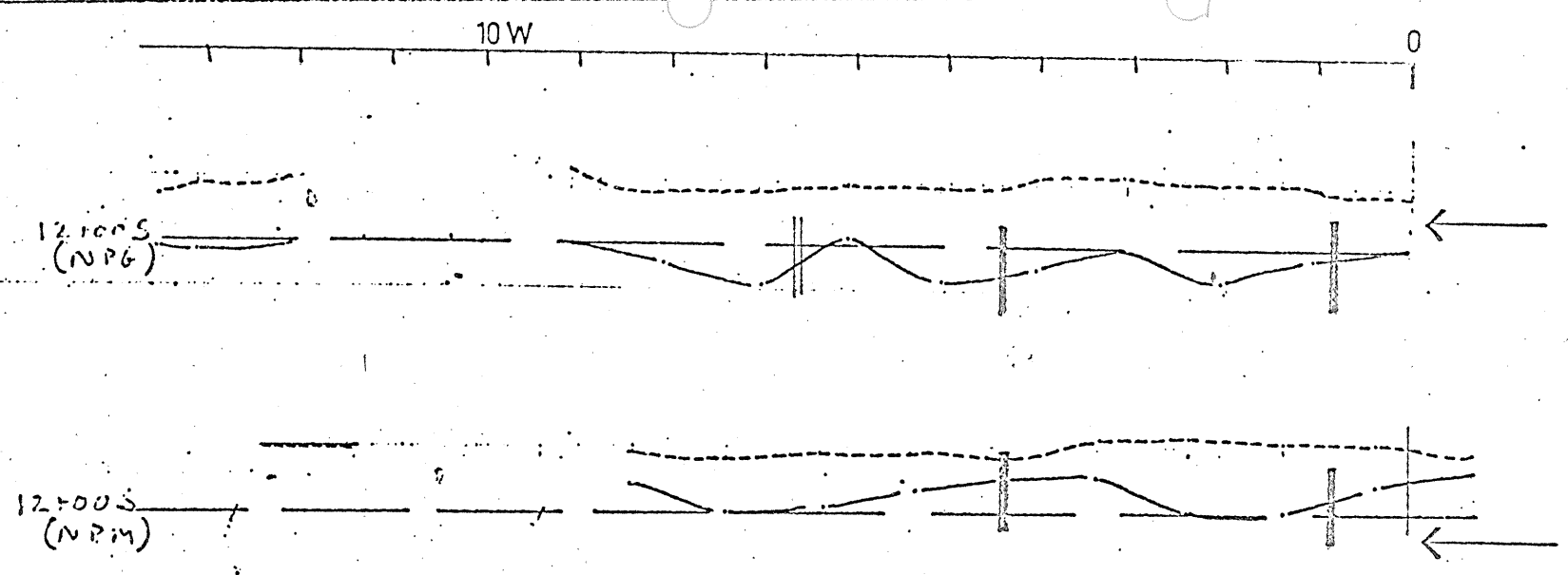
Geologic interpretations cannot be accurately inferred from the data present without knowledge of 'type' results over known geology in this area. Some general statements as to possible rock types have been suggested in the interpretation.


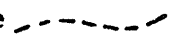


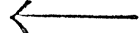
Checks over the conductive zones are recommended with conventional EM methods such as Crone or Ronka horizontal loop in order that attitudes of possible vein structures may be determined.

Respectfully submitted,

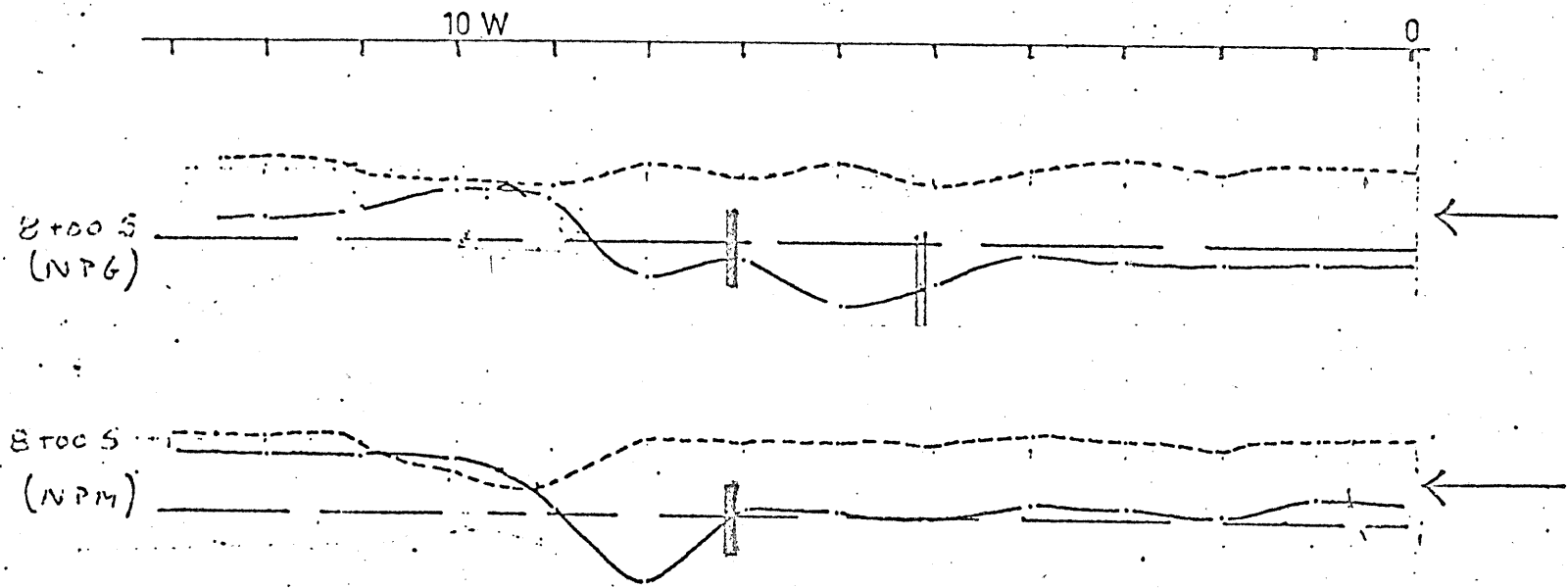
A handwritten signature in cursive script, appearing to read "John S. Brock".

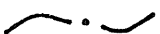
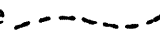
John S. Brock





In phase response 
 Quadrature response 
 Strong conductor 
 Weak conductor 
 Lead geochemical response Pb
 Direction of EM 16 orientation 
 Profile scale 1:40%
 Horizontal scale 1:200

Electromagnetic Profiles
 Figure 1



In phase response 
 Quadrature response 

Strong conductor 

Weak conductor 

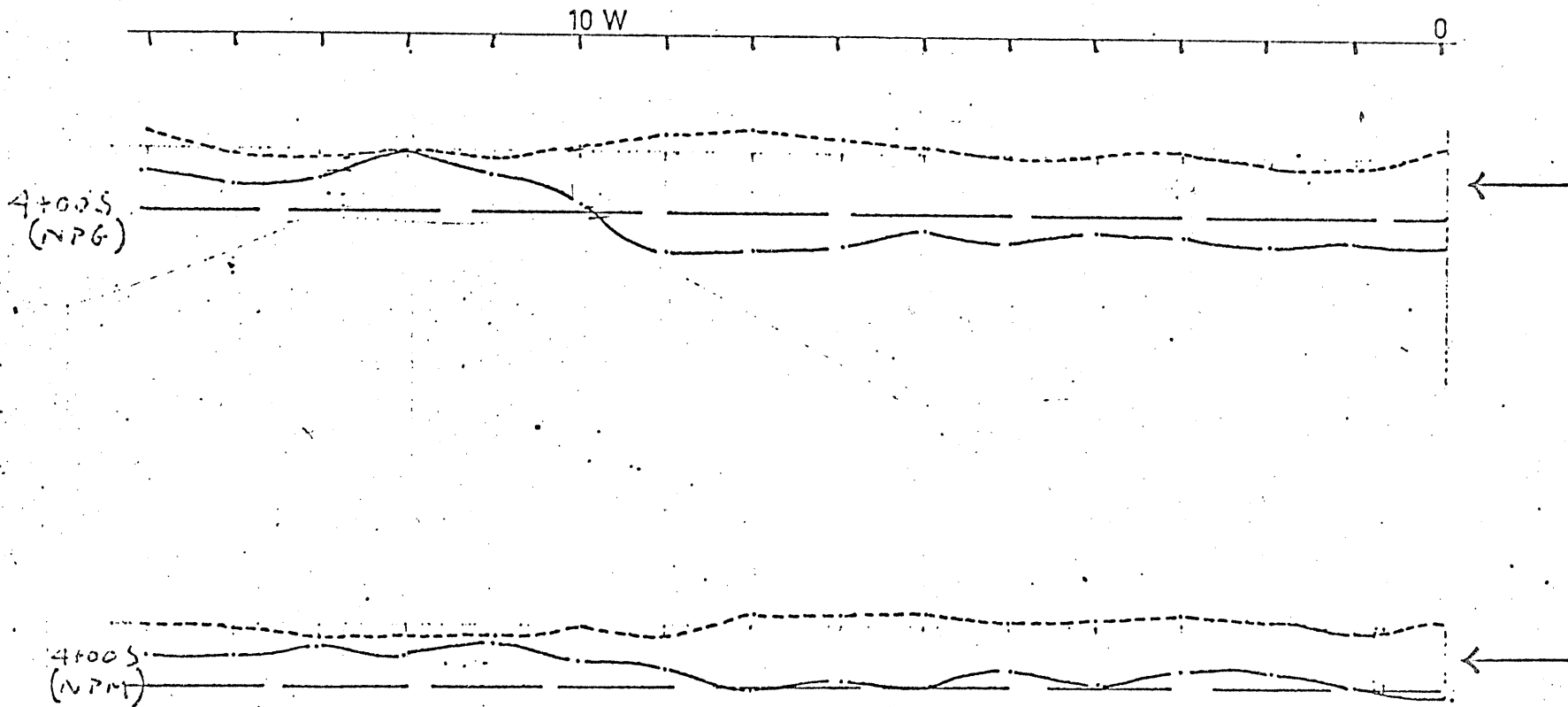
Lead geochemical response Pb

Direction of EM 16 orientation





Profile scale 1:40%

Horizontal scale 1:200

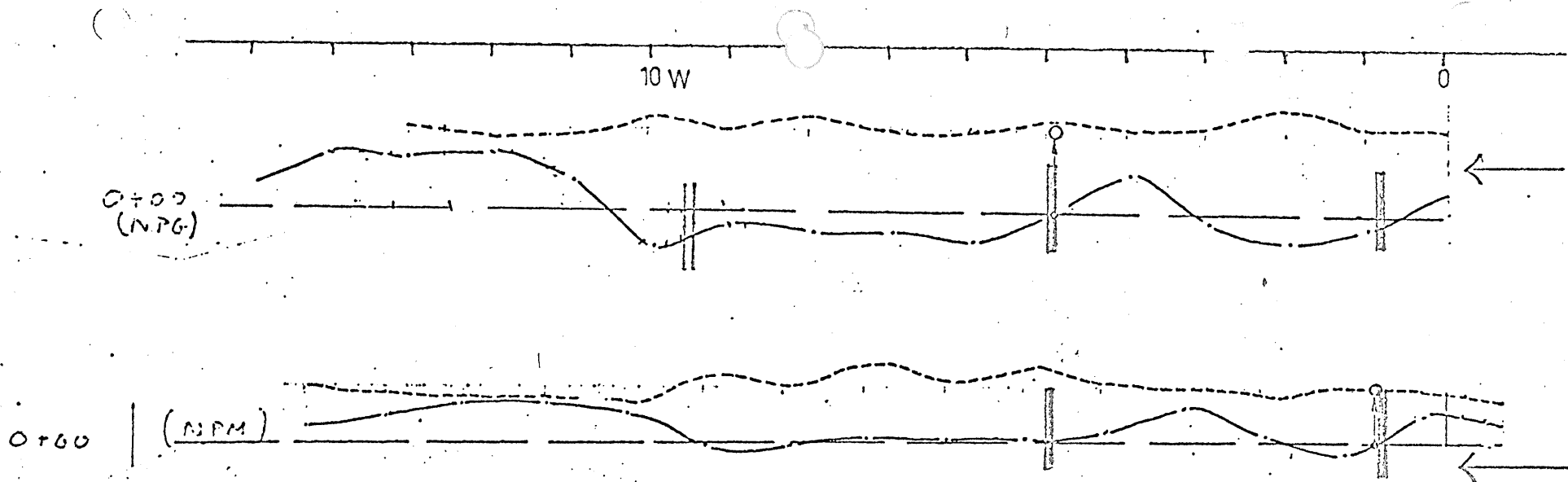
Electromagnetic Profiles
 Figure 2






Lead geochemical response Pb
 Direction of EM 16 orientation
 Profile scale 1:40%
 Horizontal scale 1:200


In phase response 
 Quadrature response 
 Strong conductor 
 Weak conductor 

Electromagnetic Profiles
 Figure 3



In phase response 
 Quadrature response 

Strong conductor 

Weak conductor 

Lead geochemical response Pb

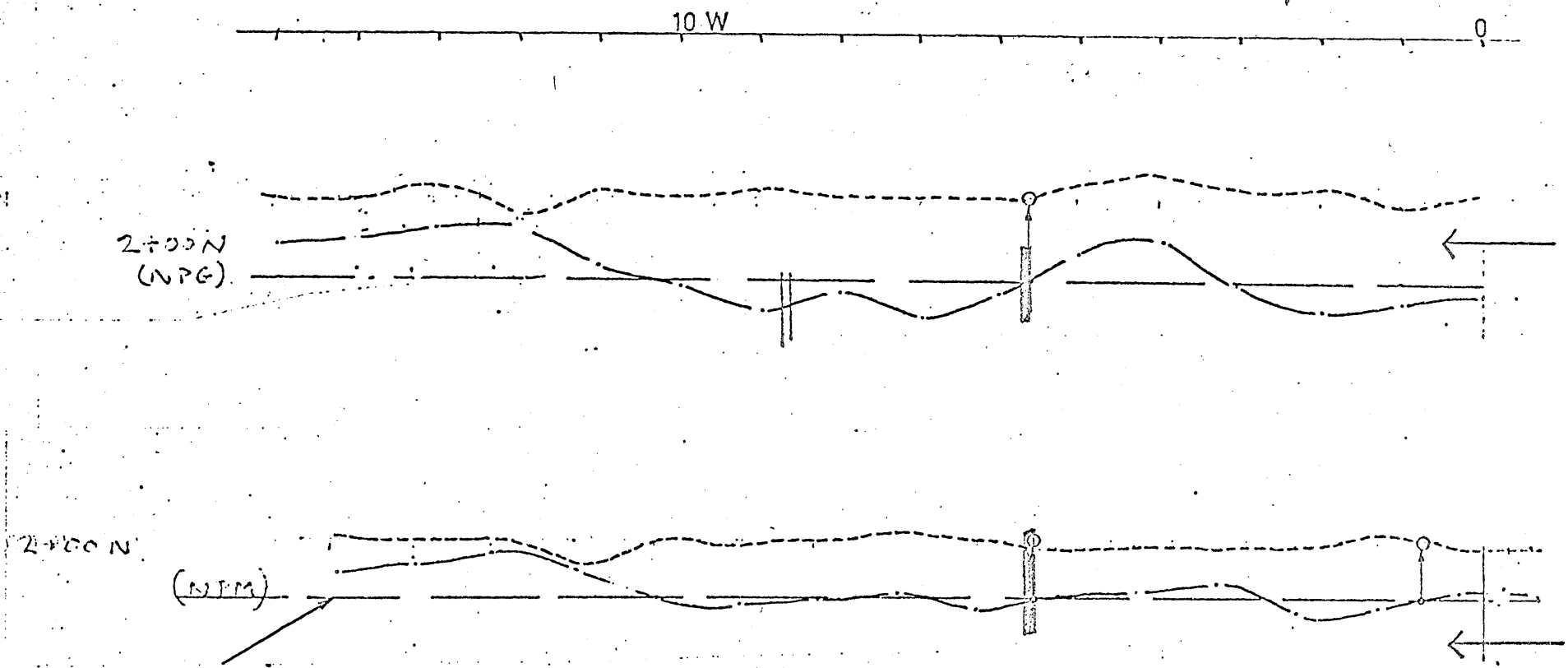
Direction of EM 16 orientation


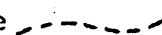


Profile scale 1:40%


Horizontal scale 1:200

Electromagnetic Profiles

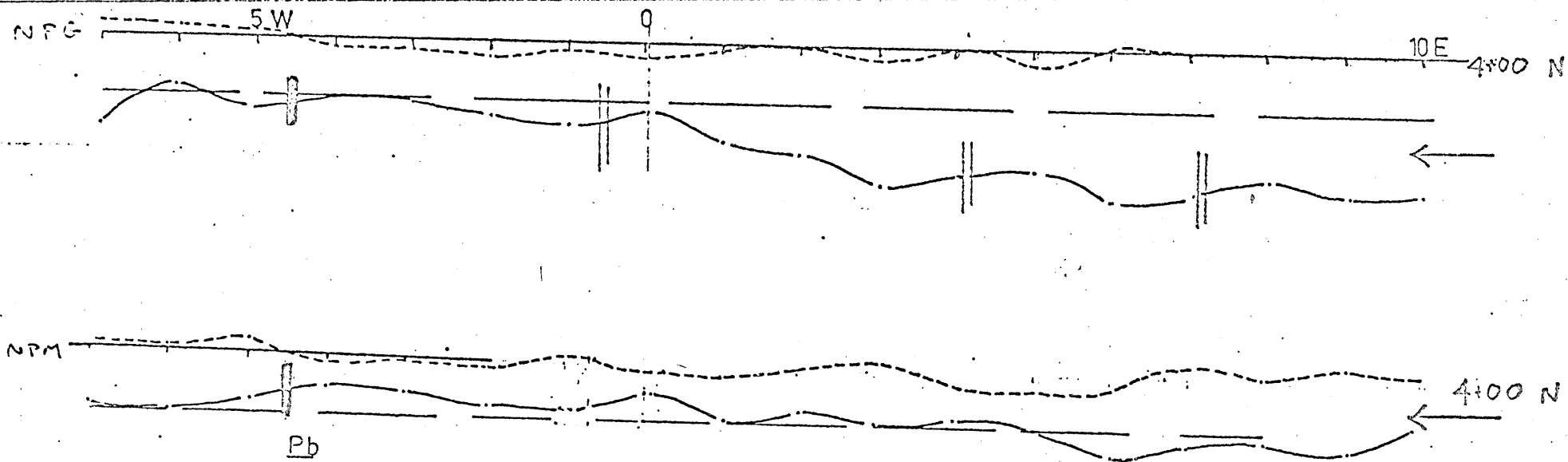
Figure 4

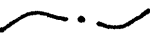
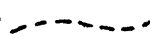



In phase response 
 Quadrature response 
 Strong conductor 
 Weak conductor 


Pb Pb
 Lead geochemical response Pb
 Direction of EM 16 orientation 
 Profile scale 1:40%
 Horizontal scale 1:200

Electromagnetic Profiles
 Figure 5



In phase response 
 Quadrature response 

Strong conductor 

Weak conductor 

Lead geochemical response Pb

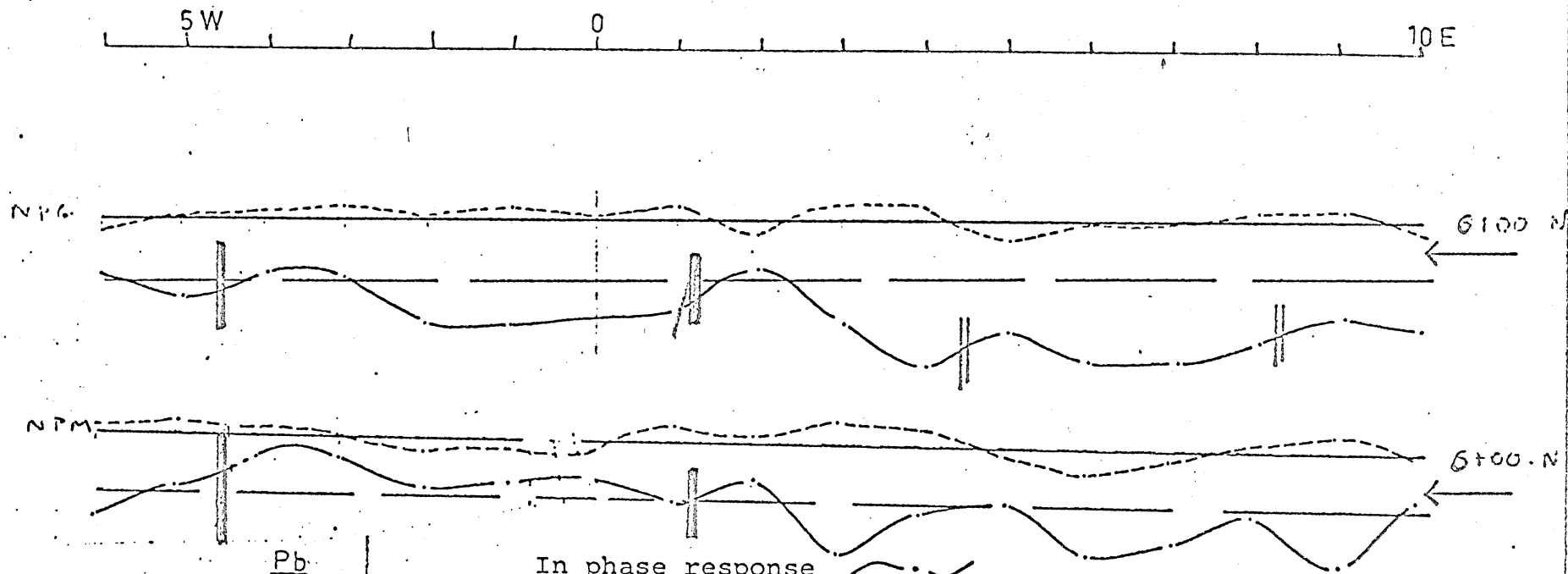
Direction of EM 16 orientation

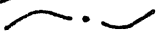
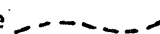
Profile scale 1:40%


Horizontal scale 1:200


Electromagnetic Profiles

Figure 6



In phase response 
 Quadrature response 

Strong conductor 

Weak conductor 

Lead geochemical response Pb

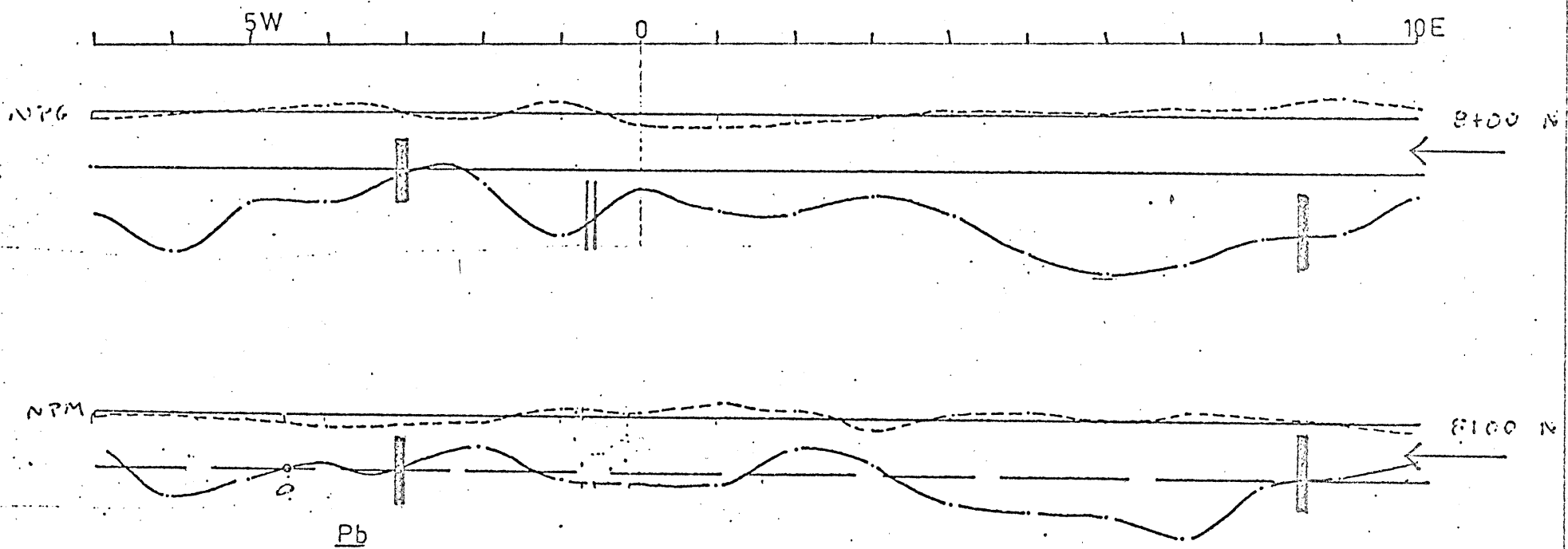
Direction of EM 16 orientation



Profile scale 1:40%


Horizontal scale 1:200


Electromagnetic Profiles

Figure 7



In phase response 
 Quadrature response 

Strong conductor 

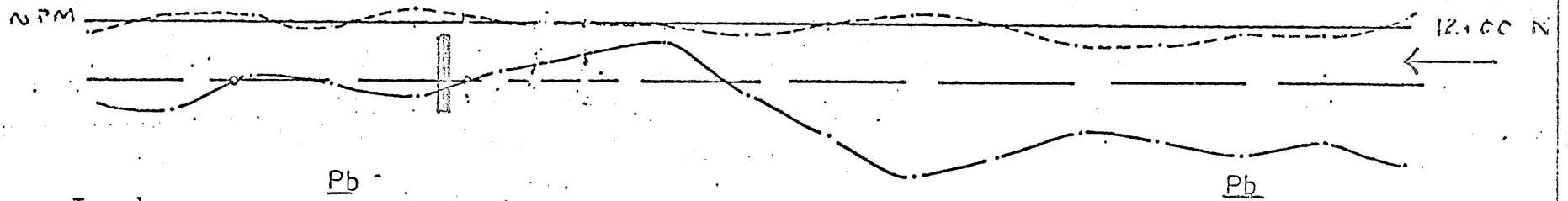
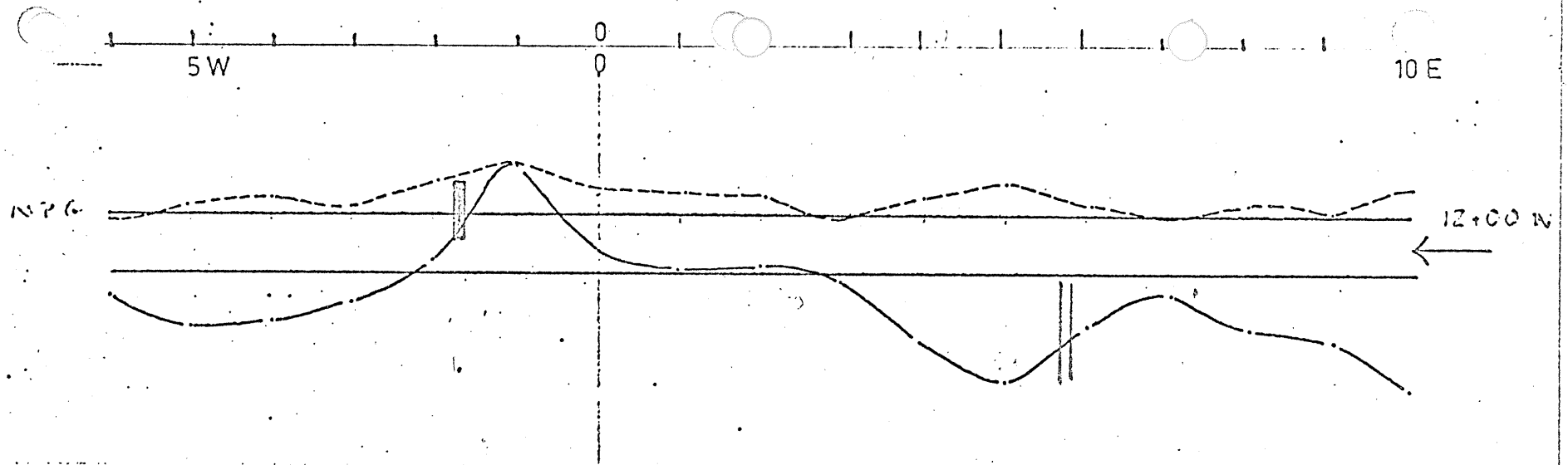
Weak conductor 

Lead geochemical response Pb

Direction of EM 16 orientation

Profile scale 1:40%

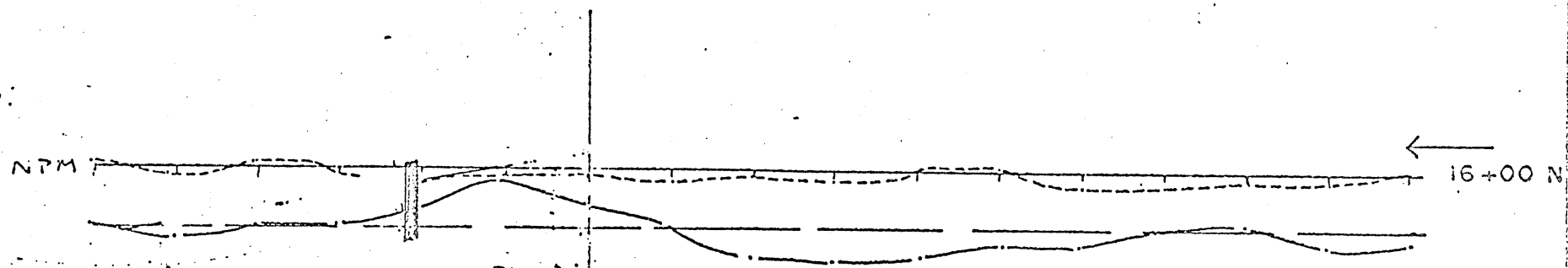
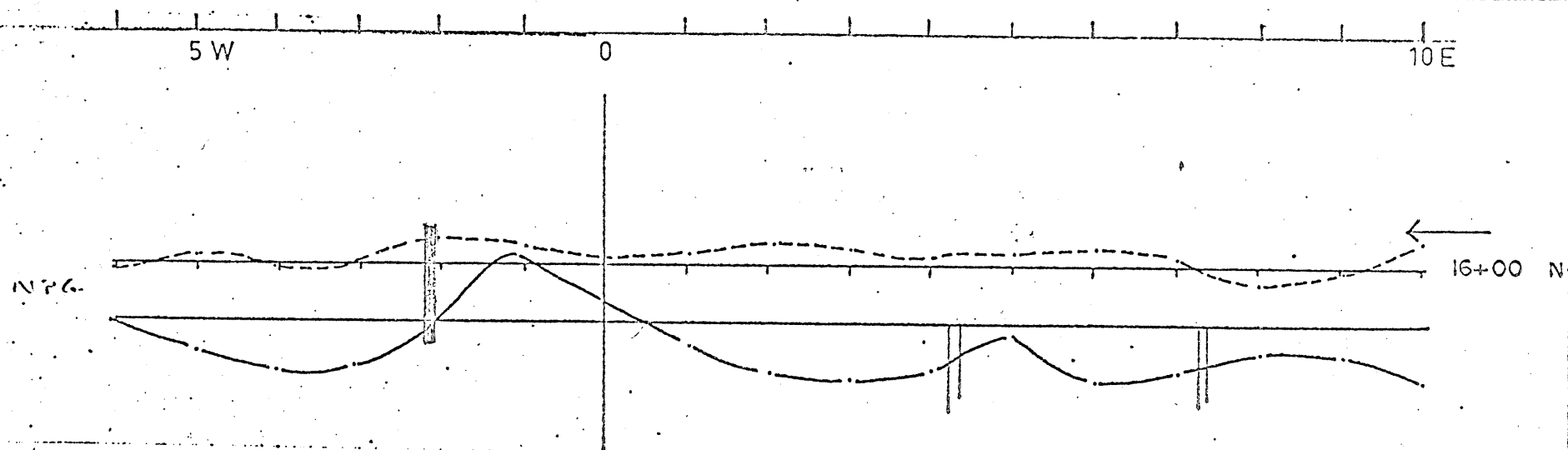
Horizontal scale 1:200







Pb
 In phase response ———
 Quadrature response - - -
 Strong conductor ||
 Weak conductor ||
 Lead geochemical response Pb
 Direction of EM 16 orientation
 Profile scale 1:40%
 Horizontal scale 1:200

Electromagnetic Profiles

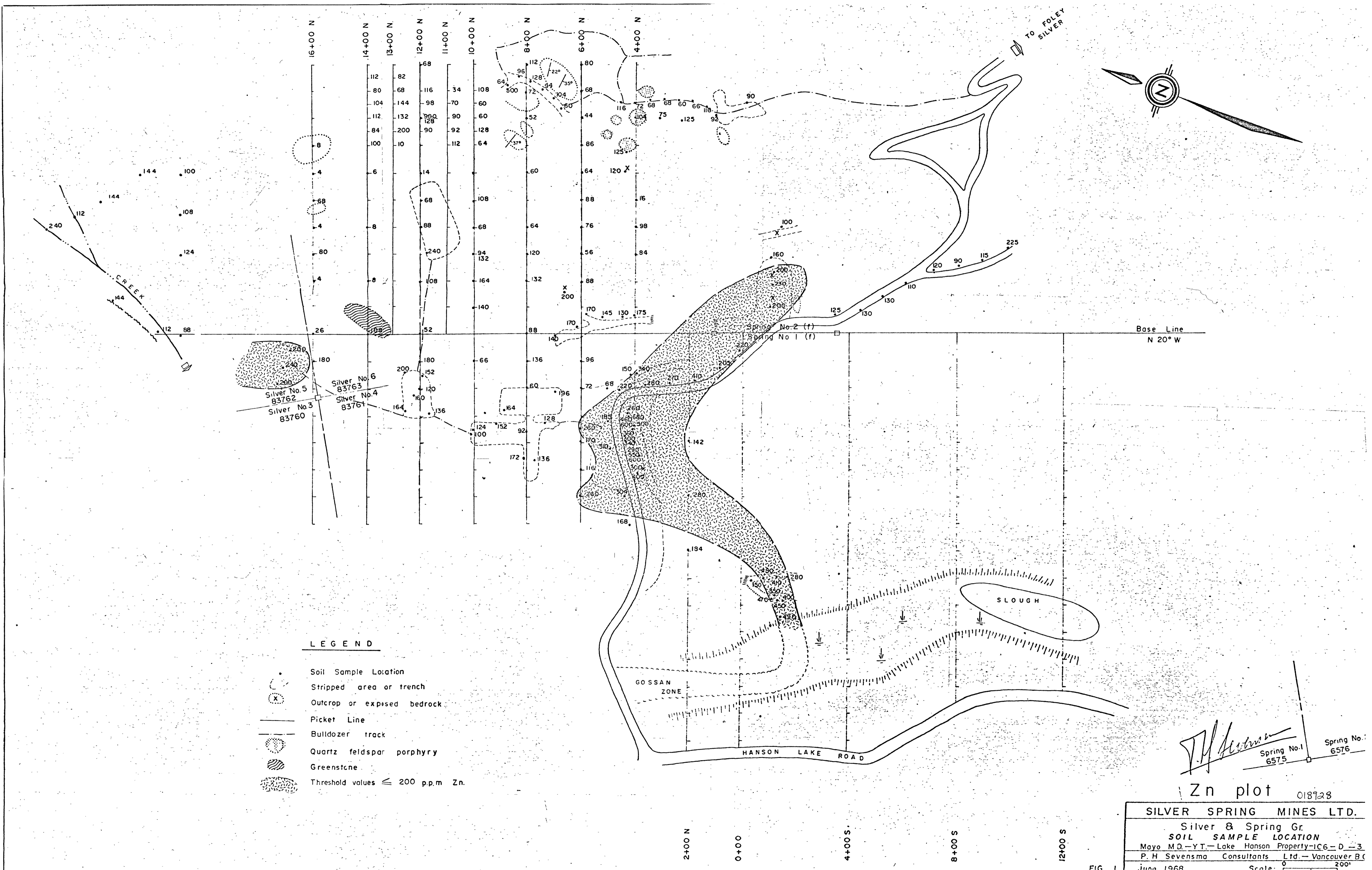
Figure 9



In phase response 
 Quadrature response 
 Strong conductor 
 Weak conductor 

Lead geochemical response Pb
 Direction of EM 16 orientation
 Profile scale 1:40%
 Horizontal scale 1:200

Electromagnetic Profiles
 Figure 10



LEGEND

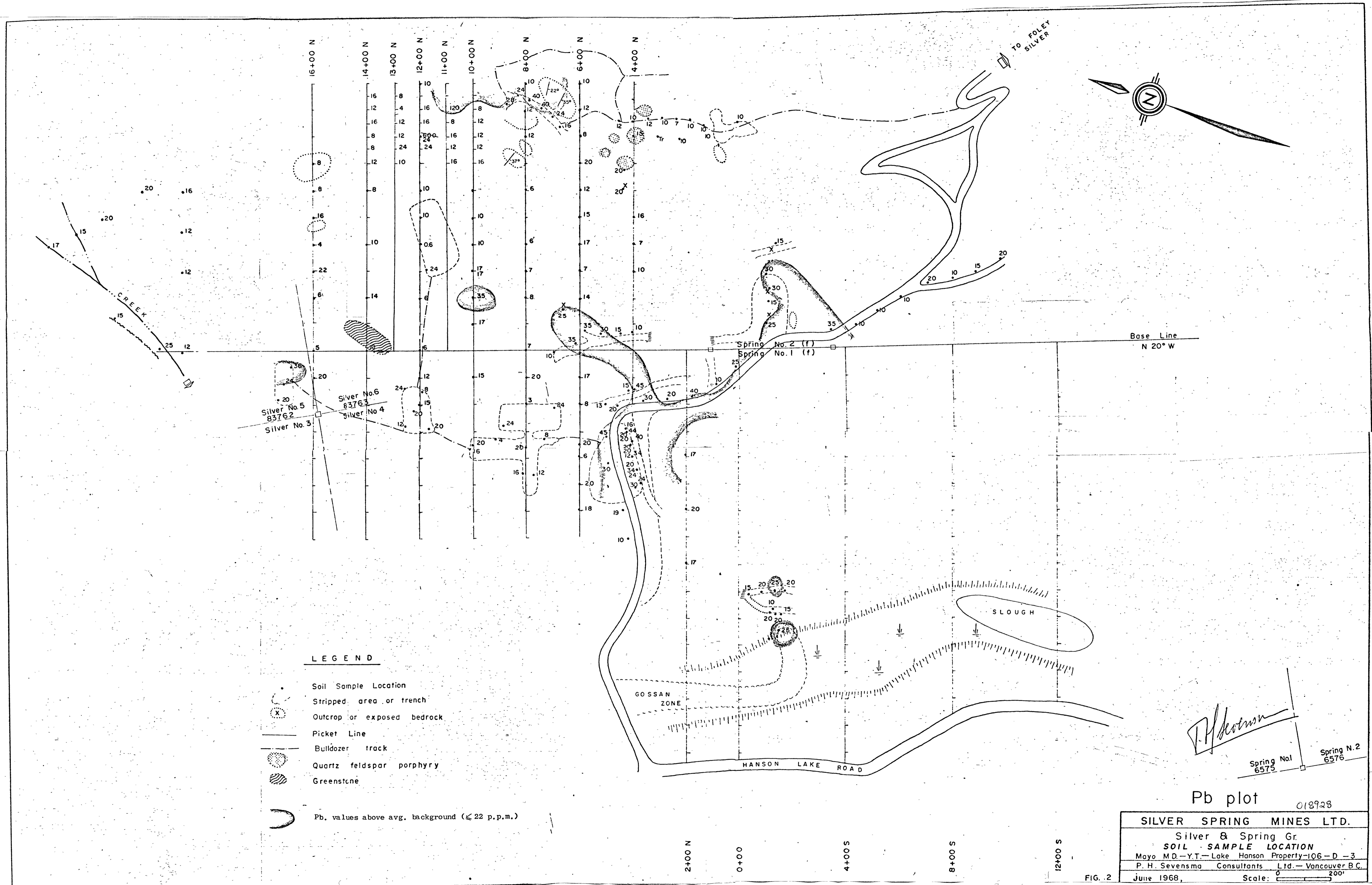
- Soil Sample Location
- Stripped area or trench
- ⊗ Outcrop or exposed bedrock
- Picket Line
- Bulldozer track
- ⊙ Quartz feldspar porphyry
- ⊞ Greenstone
- ⊞ Threshold values ≤ 200 p.p.m Zn.

SILVER SPRING MINES LTD.

Silver & Spring Gr.
 SOIL SAMPLE LOCATION
 Mayo M.D.-Y.T.-Lake Hanson Property-1C6-D-3
 P. H. Sevensma Consultants Ltd.-Vancouver B.C.
 June 1968. Scale: 0 200'

J. H. Sevensma
 Spring No. 1 6575 Spring No. 6576

Zn plot 018928



LEGEND

- Soil Sample Location
- Stripped area or trench
- X Outcrop or exposed bedrock
- Picket Line
- Bulldozer track
- Quartz feldspar porphyry
- Greenstone
- Pb. values above avg. background (≤ 22 p.p.m.)

Base Line
N 20° W

P. Johnson

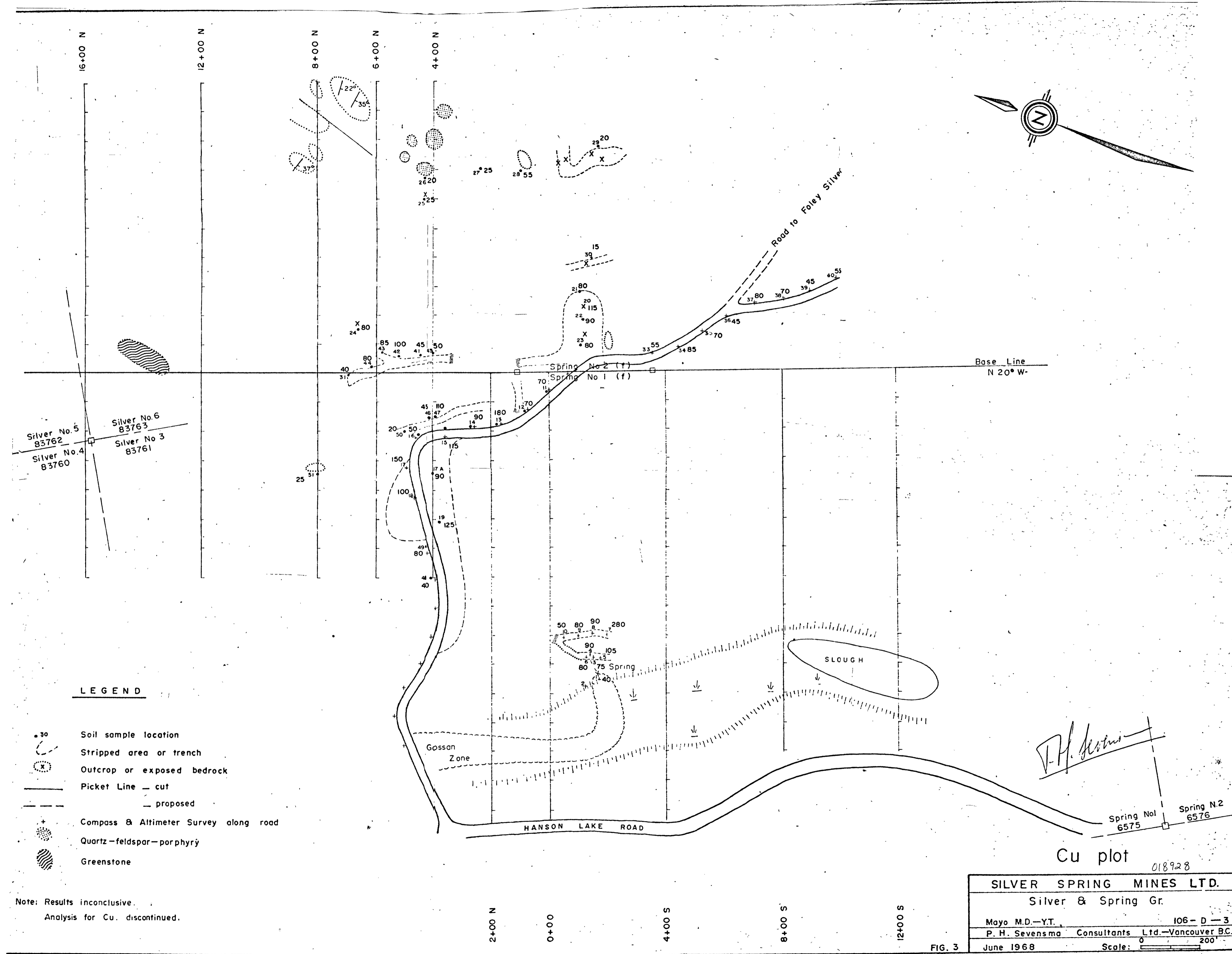
Spring No. 1
6575

Spring N. 2
6576

Pb plot 018928

SILVER SPRING MINES LTD.	
Silver & Spring Gr.	
SOIL SAMPLE LOCATION	
Mayo M.D.-Y.T.-Lake Hanson Property-106-D-3	
P. H. Sevensma Consultants Ltd.-Vancouver B.C.	
June 1968,	Scale:

FIG. 2



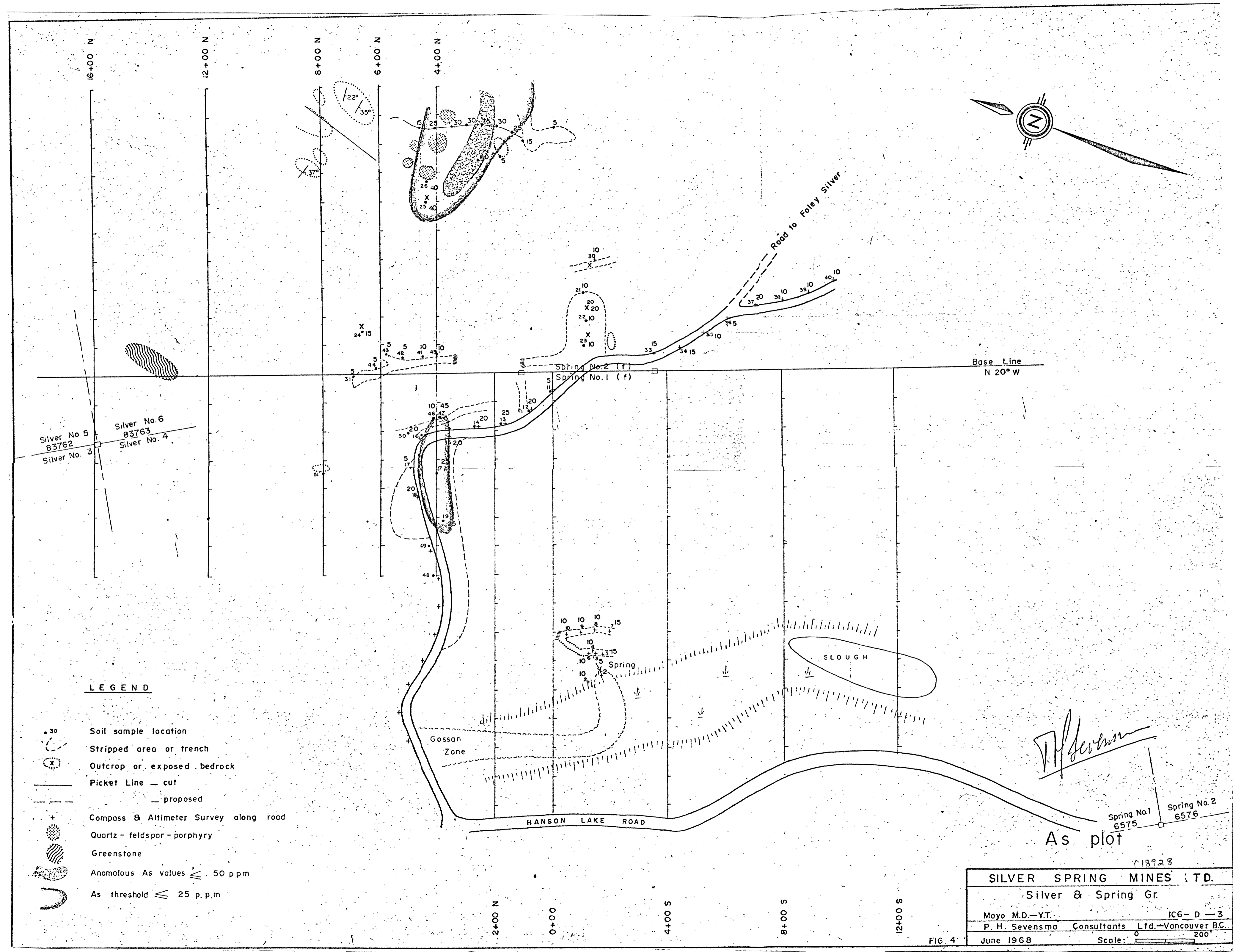
LEGEND

- 30 Soil sample location
- Stripped area or trench
- ⊗ Outcrop or exposed bedrock
- Picket Line — cut
- - - - - proposed
- + Compass & Altimeter Survey along road
- ⊙ Quartz-feldspar-porphyrý
- ⊚ Greenstone

Note: Results inconclusive.
Analysis for Cu. discontinued.

SILVER SPRING MINES LTD.	
Silver & Spring Gr.	
Mayo M.D.-Y.T.	106-D-3
P. H. Sevensma Consultants Ltd.-Vancouver B.C.	Scale: 0 200
June 1968	

FIG. 3

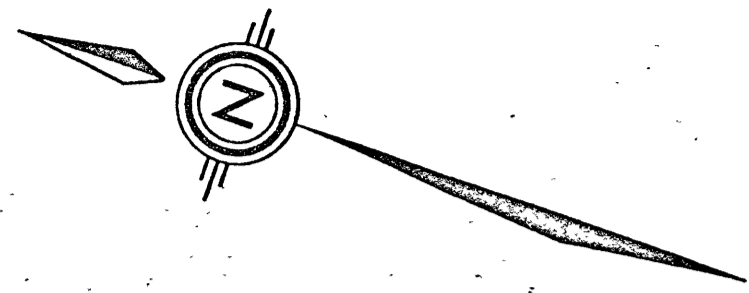
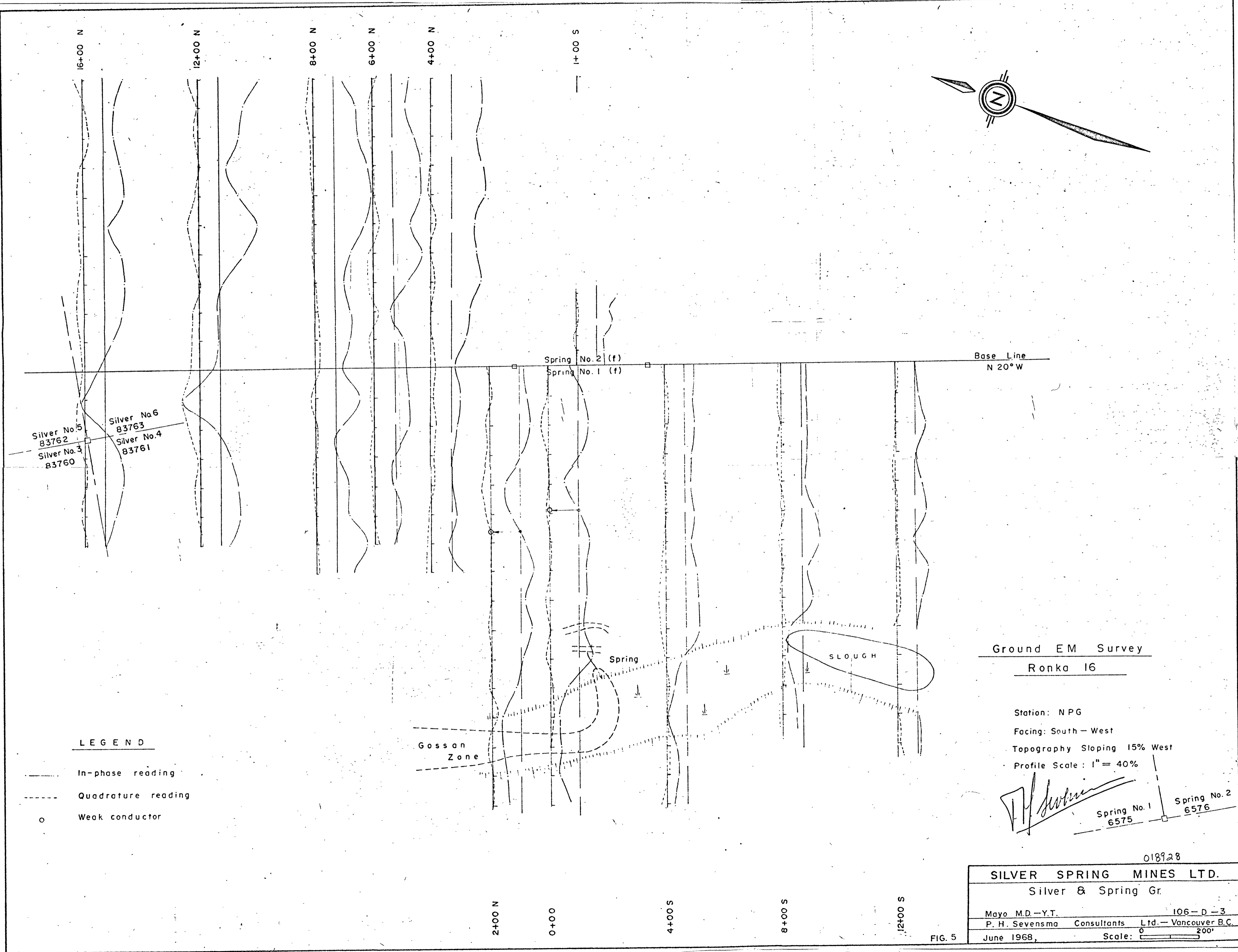


LEGEND

- Soil sample location
- Stripped area or trench
- Outcrop or exposed bedrock
- Picket Line — cut
- proposed
- Compass & Altimeter Survey along road
- Quartz - feldspar - porphyry
- Greenstone
- Anomalous As values ≤ 50 ppm
- As threshold ≤ 25 p.p.m

718928	
SILVER SPRING MINES LTD.	
Silver & Spring Gr.	
Mayo M.D.-Y.T.	IC6-D-3
P. H. Sevensma Consultants Ltd.-Vancouver B.C.	
June 1968	Scale: 1:200

FIG. 4



LEGEND

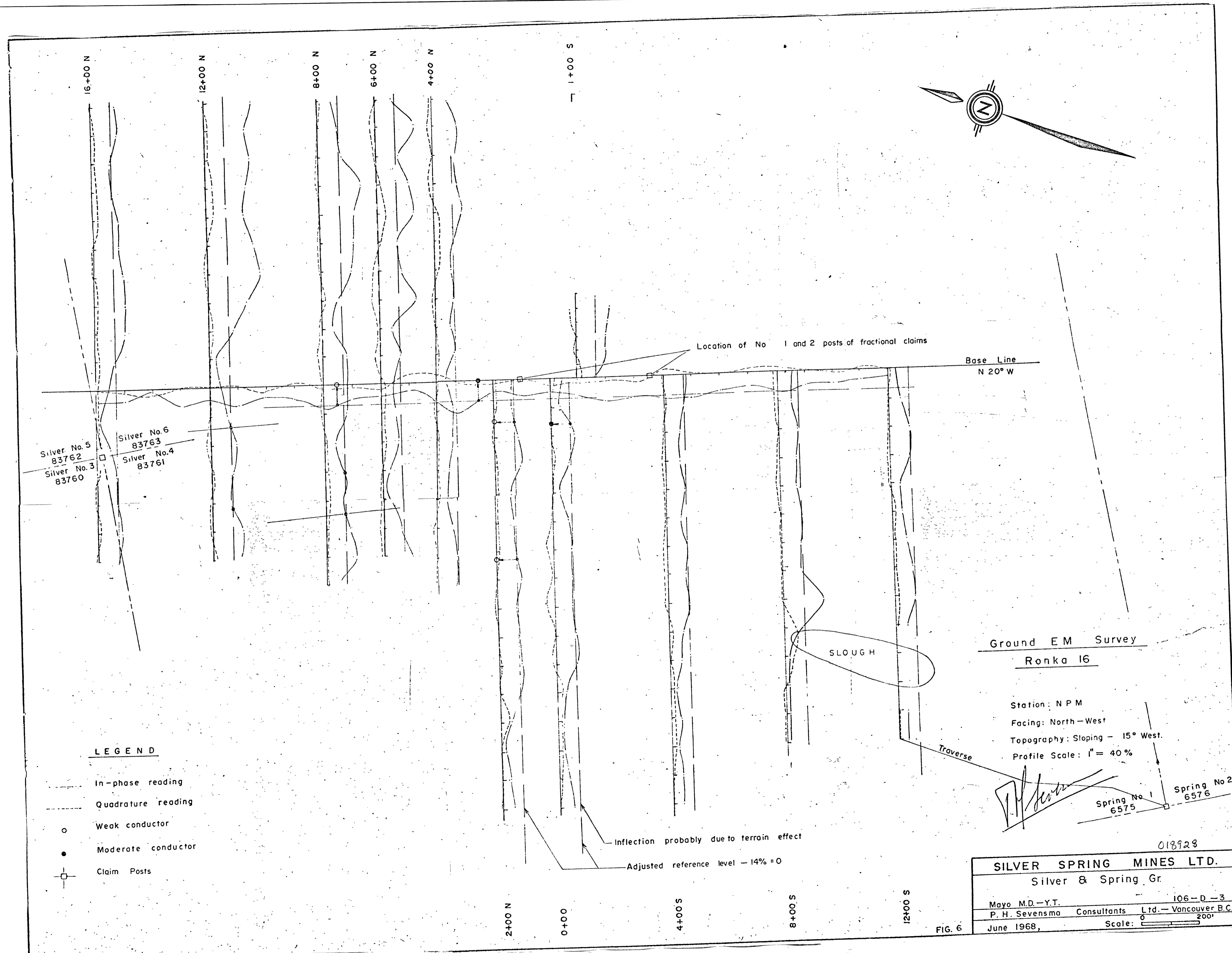
- In-phase reading
- - - Quadrature reading
- o Weak conductor

**Ground EM Survey
Ronka 16**

Station: NPG
 Facing: South - West
 Topography Sloping 15% West
 Profile Scale: 1" = 40%

018928	
SILVER SPRING MINES LTD.	
Silver & Spring Gr.	
Mayo M.D.-Y.T.	106-D-3
P. H. Sevensma Consultants Ltd. - Vancouver B.C.	
June 1968,	Scale: 0 200'

FIG. 5



Silver No. 5
83762
Silver No. 3
83760

Silver No. 6
83763
Silver No. 4
83761

Location of No 1 and 2 posts of fractional claims

Base Line
N 20° W

Ground EM Survey
Ronka 16

Station: NPM
Facing: North-West
Topography: Sloping - 15° West.
Profile Scale: 1" = 40%

Spring No. 1
6575

Spring No. 2
6576

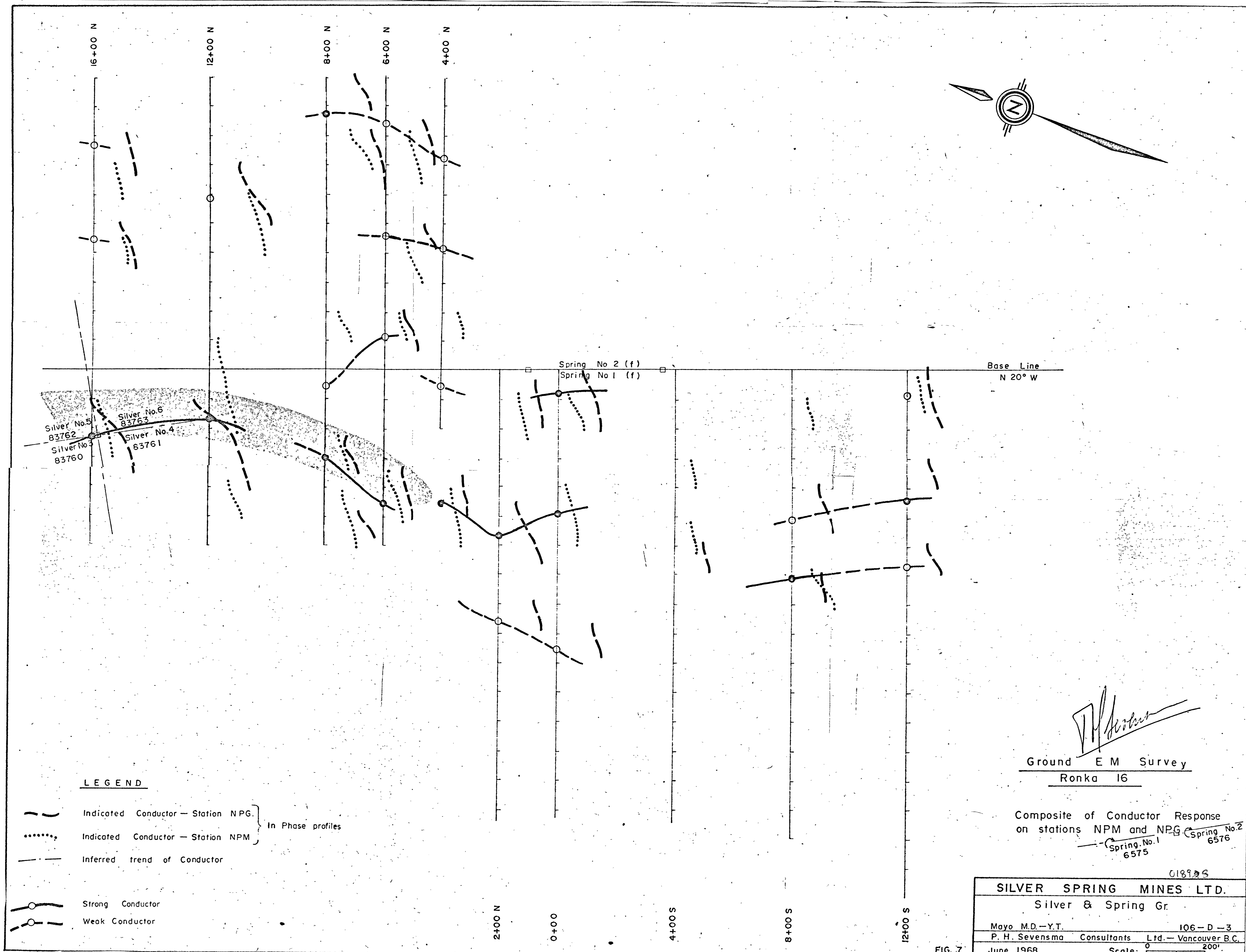
LEGEND

- - - - - In-phase reading
- - - - - Quadrature reading
- o Weak conductor
- Moderate conductor
- Claim Posts

Inflection probably due to terrain effect

Adjusted reference level - 14% = 0

018928	
SILVER SPRING MINES LTD.	
Silver & Spring Gr.	
Mayo M.D.-Y.T.	106-D-3
P. H. Sevensma Consultants Ltd.- Vancouver B.C.	Scale: 0 200'
June 1968,	FIG. 6



LEGEND

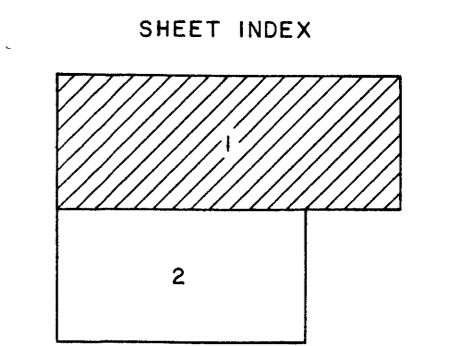
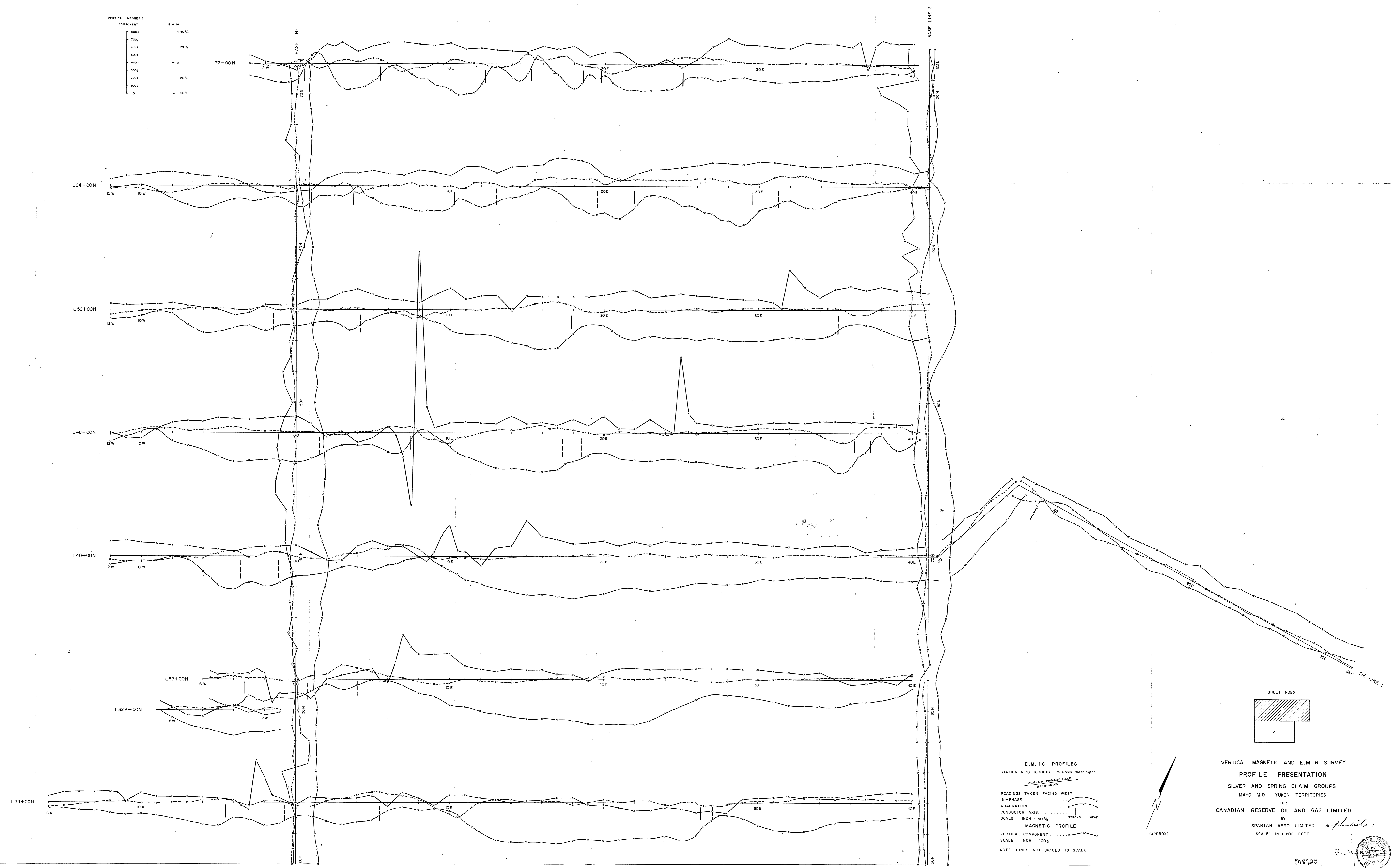
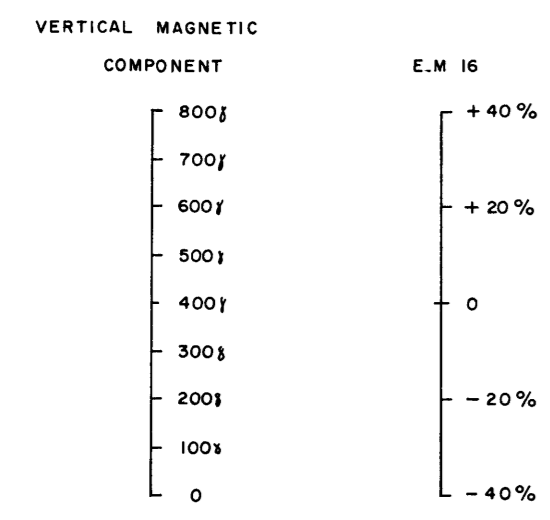
- Indicated Conductor - Station NPG. } In Phase profiles
- Indicated Conductor - Station NPM }
- Inferred trend of Conductor
- Strong Conductor
- Weak Conductor

Ground EM Survey
Ronka 16

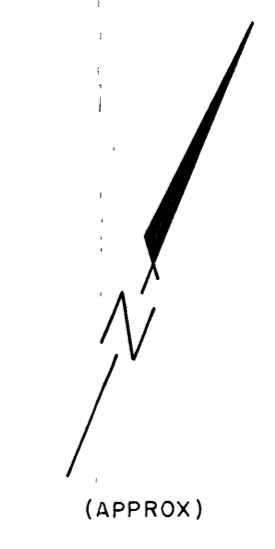
Composite of Conductor Response
on stations NPM and NPG
Spring No. 1 6575
Spring No. 2 6576

018925	
SILVER SPRING MINES LTD.	
Silver & Spring Gr.	
Mayo M.D.-Y.T.	106-D-3
P. H. Sevensma Consultants Ltd. - Vancouver B.C.	
June 1968,	Scale:

FIG. 7



E.M. 16 PROFILES
 STATION NPG, 18.6K Hz Jim Creek, Washington
 WASHINGTON
 READINGS TAKEN FACING WEST
 IN-PHASE
 QUADRATURE
 CONDUCTOR AXIS
 SCALE: 1 INCH = 40%
 MAGNETIC PROFILE
 VERTICAL COMPONENT
 SCALE: 1 INCH = 400%
 NOTE: LINES NOT SPACED TO SCALE



VERTICAL MAGNETIC AND E.M. 16 SURVEY
 PROFILE PRESENTATION
 SILVER AND SPRING CLAIM GROUPS
 MAYO M.D. - YUKON TERRITORIES
 FOR
 CANADIAN RESERVE OIL AND GAS LIMITED
 BY
 SPARTAN AERO LIMITED
 SCALE: 1 IN. = 200 FEET