GEOLOGICAL AND GEOCHEMICAL

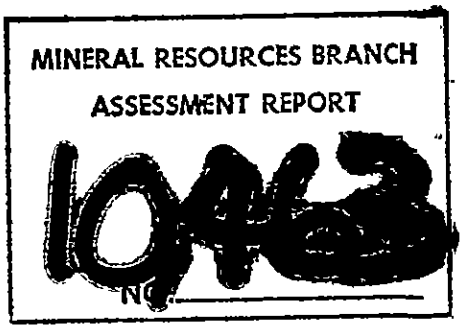
ASSESSMENT REPORT
COMMONWEALTH PROPERTY
(HOOKER AND HIDDEN TREASURE CLAIMS)
SLOCAN MINING DIVISION
NTS 82 F/10

Lat: 49°40' Long: 116°40'

OWNER: GREENWICH RESOURCES INC.

OPERATOR: GREENWICH RESOURCES, INC.

CONSULTANT CONTRACTOR: ROBERTSON RESEARCH CANADA LIMITED



BY

JOHN S. HAND, M.Sc.(A), P. Geol.
ROBERTSON RESEARCH CANADA LIMITED

FEBRUARY 1982

TABLE OF CONTENTS

Page No.

LIST OF TABLES

LIST OF FIGURES

(in back pocket)

LIST OF APPENDICES

1. SUMMARY

This report describes and summarizes field and technical survey results from activities carried out in 1980 and 1981 on the Commonwealth property situated near the headwaters of Hooker Creek, about 18 kilometres east of Kootenay Bay in southeastern British Columbia.

Four promising mineralized zones have been identified on the property: the Commonwealth, the Ruby, the Hooker Pass and the Empress occurrences. To date, the Commonwealth deposit has shown the most promise, averaging some 28 oz. Ag per short ton, 19.36% Pb, 2.24% Cu and 1.38% Zn from selected (1980) grab samples. The favoured geological setting and environment is semi-massive to massive sulphides hosted in quartz stockworks and veinlets localized within a dolomitic limestone of late Proterozoic or early Cambrian age. Other promising but as yet unexplored locations and environments exist on the property.

Detailed, but limited reconnaissance geological, geochemical and geophysical programs in 1980 and 1981 have consolidated and confirmed the areas of interest but have not been fully successful in extending lengths and widths of known sulphide-bearing occurrences. Geochemistry has shown to be an effective exploration guide and, multi-element analyses of stream, soil and rock samples has enhanced understanding of the geological paleoenvironment, hydrothermal mineralization events and distribution of supergene anomalies.

Continued exploration is warranted. However, prior to diamond drilling it is recommended that a sufficiently detailed ground magnetic survey and a vertical loop electromagnetic survey be

undertaken to assist in locating drillhole sites, particularly in the Commonwealth occurrence grid area. Further, the existing grid should be extended, corrected, and topographically mapped for control and interpretation needs and purposes.

Regional mapping and geochemical sampling should be extended across the complete property with objectives and emphasis on evaluating and understanding known and potential sulphide-bearing environments. The estimated cost for 1982 activities is $232,000.00.

2. INTRODUCTION

2.1 Location and Access

The Commonwealth property, in the Slocan Mining Division of southeastern British Columbia, is centred on latitude 49°40' north and longitude 116°40' west. Dispositions are located on the north slope of Mount Hooker at the headwaters of Hooker Creek, a northwesterly flowing tributary of Crawford Creek. The property is situated 47 kilometres east-northeast from Nelson, B.C. (Figure 1).

The Commonwealth property is accessible on logging roads by four-wheel drive vehicles from Crawford Bay on the east shore of Kootenay Lake. A two kilometre pack trail from the end of the road leads to the main showings on the property.

2.2 Physiography and Climate

Elevations on the property range from 1650 to 2450 metres. The field season is restricted to the beginning of July to the end of September. Topography is rugged with most slopes averaging around 55% and a few slopes as steep as 89%. The outcrop exposure is good on the upper slopes (approximately 80%), to poor on the sides of the mountains (30%). On the upper slopes of the property the less resistant lithologies form narrow ravines separated by the ridges of resistant lithologies. The floors of these ravines are alpine meadows, each drained by a small intermittent flowing creek. The ridges separating the ravines are well timbered with spruce, balsam and alpine larch.

The regolith on the Commonwealth property varies from outcrop areas on the ridges to about 2 metres in the ravine bottoms. The soil profile is immature with all horizons only sporadically developed in certain areas.

2.3 History and Previous Work

Upon completion of the Pilot Bay Smelter on the eastern shores of Kootenay Lake in 1892, Crawford Bay on Kootenay Lake was central to an area of extensive prospecting. A well-travelled route from the East Kootenay area to Crawford Bay was a pack trail through Hooker Pass located just north of the main Commonwealth occurrences. The first work on the claims was carried out between 1896 and 1901. The vintage of the remains of one of the old cabins on the property suggests that some work was probably carried out in the 1920's, but there is no record of production. Various claims have been held since discovery, but little or no work was performed until the logging roads along Hooker Creek were completed in the 1960's.

The area was geologically mapped and surveyed by H.M.A. Rice between 1936 and 1938. In 1976, Eric and Jack Denny acquired the Commonwealth group of four Reverted Crown Grants.

During the 1979 field season, a small grid was located over the Commonwealth occurrences and geochemical soil sampling was conducted. The Commonwealth property was increased by 20 units in June of 1980 and a further 20 units were staked in September 1980 under the direction of Celcan Minerals Limited (Figure 1).

2.4 Property

Eric and Jack Denny of Nelson, B.C. acquired four Reverted Crown Grants that constituted the Commonwealth group in 1976. Subsequently they increased their holdings by 20 units in June 1980 and Celcan Minerals Limited directed staking of 20 additional units in September 1980. Names, lot numbers, record numbers, and assessment requirements of the land included in the agreement between Greenwich Resources, Inc. and Eric and Jack Denny are listed in Appendix 1.

2.5 Recent Work

A summary of work done is as follows:

Geochemical Survey

The following samples were collected and analysed:

245 silts
56 rock-chips

Prospecting and Geological Survey

Approximately 600 hectares were mapped at a scale of 1:5000.

Road Work

One kilometre of access road to the Commonwealth showing was completed.

Linecutting

Approximately 3 kilometres of line were cut.

A list of claims upon which the work was conducted is included in Appendix 1.

3. GEOLOGY

3.1 Regional Geology

The regional geology has been summarized by H.M.A. Rice as follows:

> Over three-quarters of the area is underlain by late Precambrian sediments of Purcell and Windermere ages. Each series is characterized by a great thickness of conformable sediments, but the two are separated by a major unconformity.
>
> The Palaeozoic era is represented by Lower Cambrian sediments occurring in fault blocks near the centre of the area and by Carboniferous sediments forming a narrow belt through Ainsworth district. The only Mesozoic sediments known in the area occur west of Kootenay Lake.
>
> The igneous rocks include both extrusives and intrusives.
>
> Lavas of two periods of vulcanism occur in the area. During the first the Irene volcanic formation of Lower Windermere age was formed, and during the second the Triassic Kaslo series, which runs in a belt through Ainsworth district. The Purcell lavas of Purcell age occur in the adjoining area to the east.
>
> The earliest known intrusive bodies are the Purcell intrusives; immense, generally sill-like, bodies of uncertain but probably Precambrian age. Throughout the Windermere rocks are sheared greenstone dykes and sills that may be related to the Purcell intrusives or may be younger.
>
> Granitic bodies occur plentifully throughout the area. These bodies vary in size and shape from small, roughly circular stocks and bosses to irregular masses of batholithic dimensions. They are probably of late Mesozoic age.
>
> Many dark-coloured dykes and sills occur along the west side of Kootenay Lake. Some of these have the composition of a syenite and others that of a typical lamprophyre. Possibly there are two sets of intrusives of different ages, both younger than the granitic rocks.

In the vicinity of Bayonne (Tye) occur three or four elliptical, stocklike bodies believed to be volcanic necks. These vary markedly in composition, but appear to be clearly related to the syenitic dykes and sills. They are almost certainly of Tertiary age.

Figure 1 shows the geology in the area surrounding the Commonwealth property and Table 1 contains the summary of the formations.

The main showing on the Commonwealth property occurs in the Horsethief Creek series of sediments which conformably overlie the Toby Formation conglomerate.

3.2 Local Geology

The geological mapping of the Commonwealth property was carried out using uncontrolled 5000 scale airphoto enlargements. Due to a very short field season this year, only the Hooker claim group was mapped at 1:5000 scale (Figure 2). The remainder of the property was traversed at a reconnaissance level.

3.2.1 Mount Nelson Formation

Beds of grey, green and black laminated argillite, magnesian limestone, argillaceous limestone and quartzite that overlies the Dutch Creek Formation conformably are known as the Mount Nelson Formation.

The Mount Nelson Formation in the map area is essentially comprised of a grey to dark grey laminated argillite containing a bed of buff weathering dolomite about 30 metres thick that overlies a white hard magnesian limestone and minor quartzite sequence. It is this white limestone that hosts the Hooker Pass showings.

3.2.2 Toby Formation

The Toby Formation, a basal conglomerate of the Windermere, overlies the Mount Nelson Formation unconformably. A description of the lithological character of the unit is given in the section on the detailed geology of the Commonwealth showing.

3.2.3 Horsethief Creek Series

A thick sequence of argillite, quartzite, limestone and quartz pebble conglomerate, known as the Horsethief Creek Series, conformably overlies the Toby Formation conglomerate. The rest of the property is underlain by this sequence and due to its nature the units have been divided with respect to the Commonwealth showing. The argillite below the mineralization is termed footwall argillite and the argillite above the zone, hanging wall argillite. Buff weathering dolomites have been mapped in the hanging wall sequence but they are not similar to the mineralized dolomite of the Commonwealth showing. Also, lenses of intraformational quartz pebble conglomerate have been mapped in the hanging wall argillite. Grey phyllite outcrops along the western property boundary. The lower beds of the phyllite contain euhedral pyrite cubes up to 2 cm in size.

TABLE 1

TABLE OF FORMATIONS

(After H.M.A. Rice)

Cenozoic	Recent Pleistocene	
		McGregor volcanic necks, dykes, and sills
Mesozoic and (or) Cenozoic	Post Triassic	Lamprophyre dykes Granitic intrusives
Mesozoic	Triassic	Slocan series
		Kaslo series
Mesozoic and Palaeozoic	Triassic and Carboniferous	Milford group
Palaeozoic	Cambrian	Eager formation Cranbrook formation
Proterozoic (Late Precambrian)	Windermere	Greenstone intrusives Lardeau series Badshot formation Hamill series Horsethief Creek series Irene volcanic formation Toby formation
	UNCONFORMITY	
	Upper Purcell	Purcell intrusives Mount Nelson formation Dutch Creek formation
	Lower Purcell	Kitchener-Siyeh formation Creston formation Aldridge formation

4. MINERAL OCCURRENCES

4.1 The Commonwealth Showing

The geological mapping on the detailed grid over the main Commonwealth showing took five days to complete (Figure 3a). Lithologies encountered during the mapping are generally divided into two classes depending on their spatial relationship to the mineralization.

4.1.1 Foot Wall Sequence

(a) Toby Formation Conglomerate:

The Toby Conglomerate, outcropping on the extreme east side of the Commonwealth grid, is well indurated and weathers to a light to medium grey colour. The polymictic clast supported conglomerate has slight clast elongation development parallel to the regional structural trend. Over eighty percent of the clasts comprise rounded quartz pebbles and cobbles, the remaining are angular to subangular green argillite pebbles and cobbles.

(b) Crenulated Argillite:

A thick succession of crenulated argillites conformably overlie the Toby Formation. This lithology outcrops as a rusty black unit on the eastern half of the Commonwealth grid. Fresh surfaces of the rock are dark grey to black and often display pyrite casts. The unit is distinguished by its very fine-grained and crenulated nature and its euhedral pyrite crystals up to 5 mm across.

There is a varying degree of crenulation in this unit, but the degree of crenulation usually increases up to a maximum of four lineations near the contact with the Toby Formation. When the crenulations are not as predominant, the unit appears laminated rather than crenulated. Near the contact with carbonate rocks the lithology becomes limey and laminated in appearance which tends to lighten the colour of the rock and it weathers buff coloured as a result.

(c) Limestone:

A buff weathering, marble-white, finely crystalline limestone outcrops within the sequence of crenulated argillite. This well indurated limestone has been intruded by weak quartz stockwork. This stockwork can be divided into two types. The wide variety (3<10 cm) trends at 110/80 and contains sparse mineralization in the form of euhedral galena crystals two to five millimetres in size. The narrow variety (<3 cm) is barren and generally has a random orientation, however 20°/40° is common attitude.

(d) Laminated Dolomite:

The upper lithology of the foot wall sequence comprises a laminated dolomite weathering a rusty buff colour that outcrops in close proximity to the mineralized zone. The sandy dolomite contains thin (<1 mm) discontinuous laminae of very fine-grained pyrite.

4.1.2 Mineralized Zone

A buff weathering, fine to medium crystalline dolomite hosts the mineralization on the Commonwealth showing. This lithology has undergone extensive quartz stockwork and as a result the unit is resistant to mass wasting. The stockwork carries the mineralization which consists of galena, tetrahedrite, sphalerite, pyrargyrite and pyrite. Two modes of quartz stockwork are present: a wide variety (3-10 cm) that carries the bulk of the mineralization at 220/70 and a narrow variety that does not seem to have any preferred orientation. The mineralization, although sporadic, can be traced through trenches and outcrops for a total distance of 360 metres.

4.1.3 Hanging Wall Sequence

(a) Schistose Argillite:

This dark grey to black rock contains gently undulating thin felsic laminae (quartz/feldspar) and usually exhibits less crenulation or crinkle than the foot wall argillites. Thin discontinuous laminae (<1 mm) of sulphides (pyrite) that are usually partially weathered, form gentle undulations that cross cut the layering at a low angle. This feature is probably indicative or remobilization of sulphides during the last structural event.

Banded or laminated argillite is a less schistose and less crenulated variety of the schistose argillite that contains more felsic layers, outcropping on the west area of the grid. Dykes and/or sills within the hanging wall sequence of lithologies have been metamorphosed to form a biotite schist unit.

A pale green to white, siliceous argillite occurs in contact with the mineralized dolomite. This rock has a bleached appearance and contains fine-grained, weathered out sulphides. The altered zone is recessive so the true thickness of the unit can not be ascertained, but it seems likely to be no more than 5 metres. Field relationships noted in the adit indicate that the hanging wall argillites acted as an impermeable barrier to the quartz stockwork mineralizing solutions and the alteration caused by the action of these solutions.

4.1.4 Geochemistry

Analyses of the grab samples of mineralization collected from the trenches are tabulated in Table 2.

(a) Soil Sampling Survey:

Sixty-three A° soils were collected on the Commonwealth grid and analysed for Loss on Ignition, copper, lead, zinc, silver and molybdenum. The data for copper, lead and zinc are plotted on cumulative frequency diagrams (Appendix 2) and the following thresholds were chosen using the 90th percentile; copper 50 ppm, lead 100 ppm, and zinc 220 ppm. The cumulative frequency plot for zinc characteristically exhibits that element's mobility in the secondary environment.

The soil geochemical data are presented in a series of contour maps (Figures 3b to 3e). These maps highlight the central mineralized zone very well.

TABLE 2

COMMONWEALTH SHOWING GRAB SAMPLE RESULTS

Sample No.	Cu (%)	Pb (%)	Zn (%)	Ag (oz/ton)	Au (ppm)
CW-1	4.8	21.9	4.24	33.54	1.8
CW-2	0.07	34.0	2.22	32.08	0.14
CW-3	1.17	2.47	1.83	7.00	1.15
CW-4	7.9	0.8	1.82	23.62	5.1
CW-5	0.06	16.8	0.11	9.62	0.08
CW-6	2.9	9.9	0.52	18.08	2.0
CW-7	0.86	12.5	0.43	19.25	0.55
CW-8	1.22	22.7	0.38	22.46	0.8
CW-9	2.6	19.7	0.63	21.29	1.06
CW-10	0.86	52.8	1.62	99.17	0.46
Min 17*	0.003	6.26	8.75	6.5	-
Min 25*	0.003	10.3	0.01	3.7	-
Min 34*	0.002	22.9	0.009	5.6	-
Average (CW-1 to CW-10)					
$\overline{CW}$	2.24	19.36	1.38	28.61	1.21

*Chip samples from footwall in the adit 17, 25 and 34 metres from the entrance.

(b) Stream Sediment Survey:

Every twenty metres along two streams near the Commonwealth showings, 14 stream sediment samples were collected and analysed for Loss on Ignition, copper, lead, zinc, silver and molybdenum.

Two highly anomalous areas are evident: one on line 2700 N and 72 W, the other at 1820 N and 139 E (Figure 3a). Neither of these streams drain the Commonwealth workings and therefore are indicative of additional mineralization upslope to the west and east of the main zone.

(c) Lithogeochemistry:

Twenty-two rock samples were collected for whole rock analysis from representative lithologies on the Commonwealth grid. The modal percentages of the oxides for each of the rock types are plotted as a series of bar charts and on an ACK triangular coordinate graph (Appendix 3). Evidence from the ACK diagrams strongly suggests that the hanging wall and foot wall argillites are essentially the same lithology; the difference between the two being caused by metamorphism and structural styles. It is also interesting to note that all of the mineralized zone rocks plot in the same area on the ACK diagram.

The trace elements analysed are plotted on triangular coordinate graphs and as bar graphs for each rock type and element (Appendix 4).

Two interesting features are evident from the plots. The mineralized dolomite's high molybdenum content is related to the quartz stockwork and the argillite's relatively high zirconium content with respect to the carbonate's low content reflects the clastic nature of the lithology.

4.1.5 Geophysics

A VLF electromagnetic survey employing a Geonics EM-16 instrument was conducted over the grid with measurements at 30 metre station intervals. Seattle, Washington, at a frequency of 18.6 KHz, was used for the survey as it was the strongest signal received. The grid orientation prevents accurate identification and location of north-south conductors, but both profiled and Fraser filtered data indicates there may be a possible weak conductive zone between lines 0 and 18 S (see Figures 3f and 3g).

4.2 The Ruby Showing

The grid over the Commonwealth showing was extended to the north to tie in the Ruby showing which is centred at 450 N and 390 W (Figure 4). The mineralization is confined to a quartz intruded dolomite. Black laminated argillite, grey crenulated argillite, and quartz pebble conglomerate comprise the surrounding lithologies.

The black laminated argillite is distinguished by its flat black fresh surfaces and its schistose nature, and occurs to the east of the mineralized zone.

Northwest of the mineralized area there is a large outcrop of grey crenulated argillite that displays a shiny lustre on its

cleavage surfaces. This unit seems to be in faulted contact with the mineralized zone.

West of the showing there is a rather large outcrop of intraformational quartz pebble conglomerate. Near the mineralized zone this unit has been mapped interfingered with the dolomite.

The showing itself comprises a series of six mineralized trenches in dolomite that has quartz veins intruding it subparallel to strike. Trench 1, the largest, contains trace to moderate percentages of galena, tetrahedrite, ruby silver, sphalerite, malachite and pyrite disseminated in blebs and patches in the quartz veins. Trenches 2, 3, 5 and 6 contain traces of galena, malachite, azurite and hematite. Trench 4, similar in mineralization to trench 1, seems to contain the heaviest mineralization. Some of the dolomite in the trenches is weakly mineralized as well. Results of the grab samples from the Ruby trenches are listed in Table 3.

4.3 The Empress Showing

Line 180 N of the Commonwealth grid was extended to 540 W in order to perform detailed mapping and prospection of the Empress showing (Figure 5). The mineralization is confined to quartz veins and stringers of variable thickness that invade the dolomite. The surrounding lithologies are black laminated argillite, black crenulated argillite and grey crenulated argillite.

A black laminated argillite that has a flat black fresh surface and displays schistose parting occurs to the east of the mineralized zone. In the same area this unit is crenulated and is mapped as black crenulated argillite.

To the west of the mineralization there are outcrops of a unit mapped as grey crenulated argillite that exhibits a silvery grey lustre on cleavage surfaces.

The workings on the Empress consist of seven trenches and one small adit. Five trenches and the adit are in a dolomite that has been intruded with quartz veins and stringers. Chalcopyrite, galena, malachite, azurite, hematite and pyrite form the mineralization. The amount of chalcopyrite in trench 1 far exceeds any of the other minerals present. The footwalls of trenches 4 and 5 have trace amounts of pyrite, chalcopyrite and malachite. The other two trenches have been dug in quartz veins in the black laminated argillite. Results of the grab samples from the Empress trenches are listed in Table 4.

4.4 The Hooker Pass Showing

During geological reconnaissance traverses five trenches were discovered 1 km east of camp at an elevation of 2235 metres. The trenches, a few hundred metres north of Hooker Pass, are in a magnesian limestone of the Mount Nelson Formation. The mineralization in these old workings comprises galena, tetrahedrite, azurite and malachite in a quartz stockwork that cross cuts the buff dolomite/limestone. Results of the grab samples from the Hooker Pass are listed in Table 5.

TABLE 3

RUBY SHOWING TRENCH SAMPLE RESULTS

Sample No.	Cu ppm	Pb ppm	Zn ppm	Ni ppm	Co ppm	Ag ppm
RB-1-B	14	310	28	3	0	3.3
RB-1-FW	5	20	63	16	6	0.1
RB-1-HW	7	182	150	0	0	0.4
RB-2-FW	37	74	112	13	9	0.9
RB-2-HW	4	16	71	0	0	0.2
RB-3-FW	32	20	22	4	0	0.5
RB-3-HW	6	80	88	0	0	0.5
RB-4-FW	73	27	173	23	12	1.3
RB-4-HW	6	169	55	0	0	0.8
RB-5-FW	25	42	101	0	0	1.1
RB-5-HW	9	64	82	2	1	1.0
RB-6	26	107	108	0	0	1.4
RB-6-FW	67	3300	123	0	0	16.2
RB-6-HW	5	41	88	0	0	0.0

TABLE 4

EMPRESS TRENCH SAMPLE RESULTS

Sample No.	Cu ppm	Pb ppm	Zn ppm	Ni ppm	Co ppm	Ag ppm
EM-1-FW	5	19	64	10	2	0.0
EM-1-HW	2	17	40	5	2	0.2
EM-2-FW	4	16	39	2	1	0.2
EM-2-HW	18	11	62	22	3	0.2
EM-3	7400	3	40	6	4	3.2
EM-3-FW	2	9	40	6	4	0.1
EM-3-HW	33	12	56	17	4	0.0
EM-4	29	320	13	5	4	1.8
EM-4-FW	5	14	33	6	4	0.0
EM-4-HW	98	24	108	43	10	0.2
EM-5-FW	3	16	27	8	2	0.1
EM-5-HW	3	6	24	10	0	0.1
EM-7	8	32	33	5	0	0.1
EM-7-FW	6	115	182	5	4	0.6
EM-7-HW	51	84	240	18	9	0.3
EM-8	260	11	7	4	0	0.3
EM-8-FW	4	11	34	7	3	0.0
EM-8-HW	6	3	8	3	0	0.3

TABLE 5

HOOKER PASS TRENCH SAMPLE RESULTS

Sample No.	Cu (%)	Pb (%)	Zn (%)	Ni ppm	Co ppm	Ag oz/ton
HP-4	0.91	2.80	0.76	0	0	92
HP-5	1.76	0.33	1.02	1	0	87

5. GEOCHEMISTRY

5.1 Silts

Two hundred and forty-five silt samples were collected on 50 m intervals from the drainage system on the Commonwealth property and analysed for copper, lead, zinc, nickel, cobalt, silver, and molybdenum. Procedures involved in the geochemical analysis are covered in Appendix 5 and statistical information on the data is included in Appendices 6 to 8. Thresholds for copper, lead, zinc, nickel and cobalt were chosen using the 90th percentile and the results are plotted on Figure 2.

The number of anomalous sites for the elements have been summarized below:

Element	Threshold (T) (ppm)	Number of Anomalies > T	> 2x T	> 3x T
Cu	40	52	1	0
Pb	350	18	2	0
Zn	460	15	7	3
Ni	39	34	8	0
Co	20	24	5	0

The upper reaches of Caribou Creek are anomalous in nickel and cobalt possibly as a result of higher nickel-cobalt content in the Toby Conglomerate.

It is interesting to note a general increase in the number of copper anomalies towards the west of the map area. These perhaps represent copper mineralization but probably reflect the nature of the underlying phyllites.

6. ECONOMIC POTENTIAL

6.1 Genetic Concepts

The Commonwealth occurrences reflect a near shore marine environment facies model. This being the case, there is potential of at least three types of mineralization to occur (Types 1, 2 and 3). Data collected to date suggests that the mineralization in the dolomite (Type 1) could have been deposited in two possible ways. Originally, weak metal solutions migrated along basinal shales from the craton as shallow groundwater flow systems. The solutions, now low temperature brines, increased their metal content as they travelled through the reducing environment of the basinal shales and when these metalliferous solutions reached a reef complex they were oxidized and deposited as mineralization in the limestone. Subsequent metamorphism, structural deformation and intrusion of the Nelson bath resulted in the mineralization in the limestone/dolomite being remobilized by the quartz stockwork.

The other possibility for mineral deposition in the dolomite on the Commonwealth property involves later events and higher hydrothermal temperatures. After lithification of the near shore lagoonal environment sediments, and either during or after metamorphism and structural deformation, faults and fractures were created that would allow upward migration of hypothermal solutions that were emanating from the Nelson batholithic intrusion. The dolomitic reefs would naturally be more susceptible to fracturing and therefore constitute ideal host lithologies for the metalliferous hypothermal solutions.

Two other potential mineral deposit types could exist on the Commonwealth property. After consolidation of the shales upward migrating hydrothermal solutions after passing through the conglomerate would become trapped by the overlying relatively impervious shales and mineral deposition would result (Type 2). However, if the basinal brines do not encounter a reef, they may deposit mineralization in the shales triggered by either a change in temperature or chemical conditions, or both (Type 3).

6.2 Economic Considerations

Type 1 - The mineralized dolomite on the property, occurring as discontinuous bodies in the argillite sequence, averages 28 oz/ton silver and is restricted to the quartz stockwork. If additional mineralized "reefs" could be discovered in the sequence the potential discovery of a high grade small tonnage orebody is quite likely.

Type 2 - The mineralized bodies that may exist at or between the contact of the Toby Formation and the Horsethief Series could constitute a medium grade deposit one magnitude larger than Type 1.

Type 3 - This mineralization has the greatest overall extent and would be in the order of two or three magntitudes larger than Type 1. It would be a high tonnage low grade deposit.

Even if no Type 2 or Type 3 mineralization exists on the Commonwealth property as such, the information and experience gained on the property could prove invaluable on a regional exploration basis.

7. CONCLUSIONS

1. Subeconomic stockwork-hosted sulphide mineralization has been found on the Commonwealth property and there is promising potential for commercially viable mineralization.

2. Potential exists on the Commonwealth property not only for additional stockwork deposits but also for Mississippi Valley, conglomerate-related, and extensive shale-hosted type deposits.

3. The Commonwealth occurrence includes mineralization grading 28 oz/ton silver and is confined to a quartz stockwork that intrudes dolomitic limestones. The Ruby and Empress occurrences occupy similar geological environments.

4. Soil geochemistry effectively defines and outlines near-surface sulphide mineralization. The results from the 1980 soil geochemical survey in which the B horizon was sampled correlate well with 1981 A horizon results. It is concluded that the soil profile is poorly developed and that future soil sampling programs on the property need not differentiate between soil horizons.

5. The 1980 VLF electromagnetic survey proved ineffective in identifying any significant north-south conductors related to mineralization. A weak conductive zone was detected between lines 0 and 18 S.

6. Stream sediment anomalies to the east and west of the Commonwealth occurrence indicate the presence of additional near-surface sulphide mineralization. Stream sediment sampling has shown to be an effective reconnaissance and follow-up method in identifying outcropping and subcropping sulphides.

7. Whole rock analyses suggest that foot wall crenulated argillite and hanging wall schistose argillite are essentially the same lithologies and probably are representative of a marine near shore paleoenvironment.

8. RECOMMENDATIONS

1. The Commonwealth grid baseline should be extended to "tie in" all known sulphide occurrences on the property. Lines should be cut at 100 m intervals.

2. A topographic survey should be conducted on the above grid for mapping and survey control.

3. A soil sampling survey is recommended on the above grid at 100 m stations. Continued multi-element analyses is advised.

4. Completion of the geological mapping with a supporting lithogeochemistry sampling program is recommended across the proposed expanded grid.

5. A ground magnetic survey is recommended over the complete expanded grid.

6. A "shoot-back" vertical loop electromagnetic survey is recommended over the Commonwealth occurrence areas and other anomalous areas defined by promising magnetic, geological and geochemical results and responses.

7. Shallow reconnaissance diamond drilling of priority anomalies and conductors, particularly where sulphide mineralization is present or indicated is recommended for the Commonwealth occurrence at 50 m intervals, to establish continuity and depth of the zone.

8. Data acquisition and information presentation should employ air photographs enlarged to 1:5000 scale for optimized ground control of technical surveys.

9. Additional claims should be considered on the basis of a regional basin analysis appraisal to include the variety of potential deposit types concluded in Section 7(2).

9. PROPOSED EXPENDITURES - 1982

	$'000	
Physical Work:		
Linecutting - 30 km x $450	13.5	
Road Work - 4 days x $500	2.0	
Trenching - 5 days x $200	1.0	
Drilling - 500 m x $200	100.0	
Subtotal	116.5	116.5
Geology:		
Reconnaissance - 20 km x $150	3.0	
Detail - 10 km x $250	2.5	
Reporting - 10 days x $325	3.25	
Subtotal	8.75	8.75
Geophysics:		
VLEM - 20 km x $600	12.0	
Reporting - 10 days x $325	3.25	
Subtotal	15.25	15.25
Geochemistry:		
Analyses - 1000 x $20	20.0	
Reporting - 10 days x $325	3.25	
Subtotal	23.25	23.25
Travel and Transport:		
Truck - 30 days x $50	1.5	
Fuel	1.0	
Aircraft - 10 hours x $500	5.0	
Freight	0.5	
Subtotal	8.0	8.0
Camp:		
Field Office - 30 days x $27	0.8	
Food - 180 man-days x $25	4.5	
Equipment	0.5	
Communications	0.5	
Subtotal	6.3	6.3
TOTAL		178.05
Administration @ 10%		18.00
Contingencies @ 20%		35.60
GRAND TOTAL		231.65
	say	232.00

CERTIFICATE

I, John S. Hand, of Calgary, Alberta, hereby certify that:

1. I am a consulting geologist employed by Robertson Research Canada Limited, 3rd Floor, Lougheed Building, 604 - 1st Street S.W., Calgary, Alberta T2P 2M8.

2. I received an Honours Bachelor of Science degree in Geology from the University of Toronto in 1975 and a Master of Science (Applied) degree in Mineral Exploration from McGill University in Montreal in 1977.

3. I am a member of the Association of Professional Engineers, Geologists and Geophysicists of Alberta.

4. I have been practising my profession continuously since graduation.

5. This report is based on a review of reports, documents, maps and other technical data, and field work carried out by myself or under my direction, and on my experience and knowledge of the area.

6. I hold no interest, directly or indirectly, in the Commonwealth Property.

PROFESSIONAL GEOLOGIST ALBERTA
JOHN S. HAND, M.Sc.(A)

February 1182
Date

J. S. Hand, M.Sc.(A), P. Geol.

SELECTED REFERENCES

Rice, H.M.A., 1941.
"Nelson Map-Area, East Half, British Columbia."
Geol. Surv. Canada, Memoir 228.

APPENDIX 1

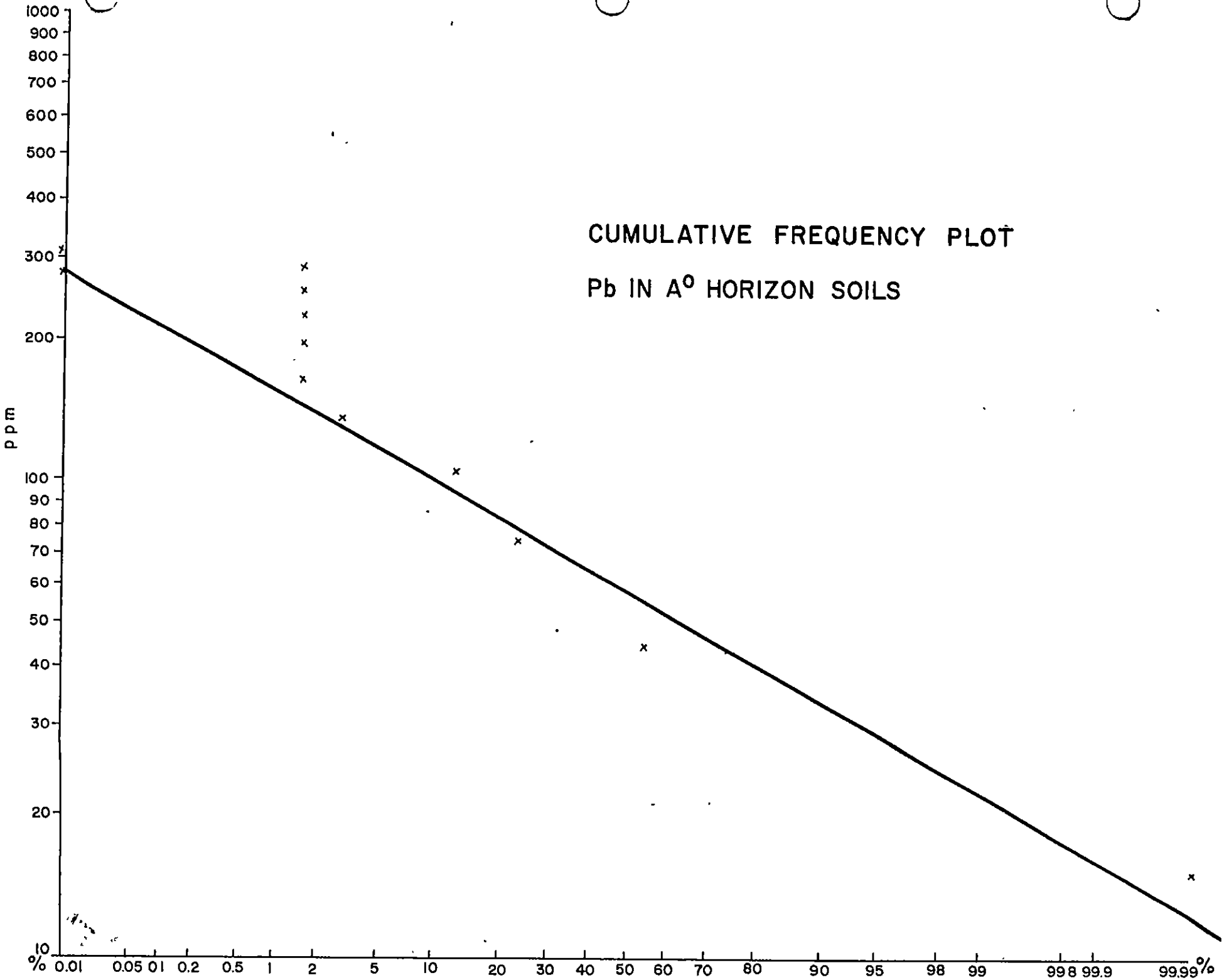
SCHEDULE OF LANDS

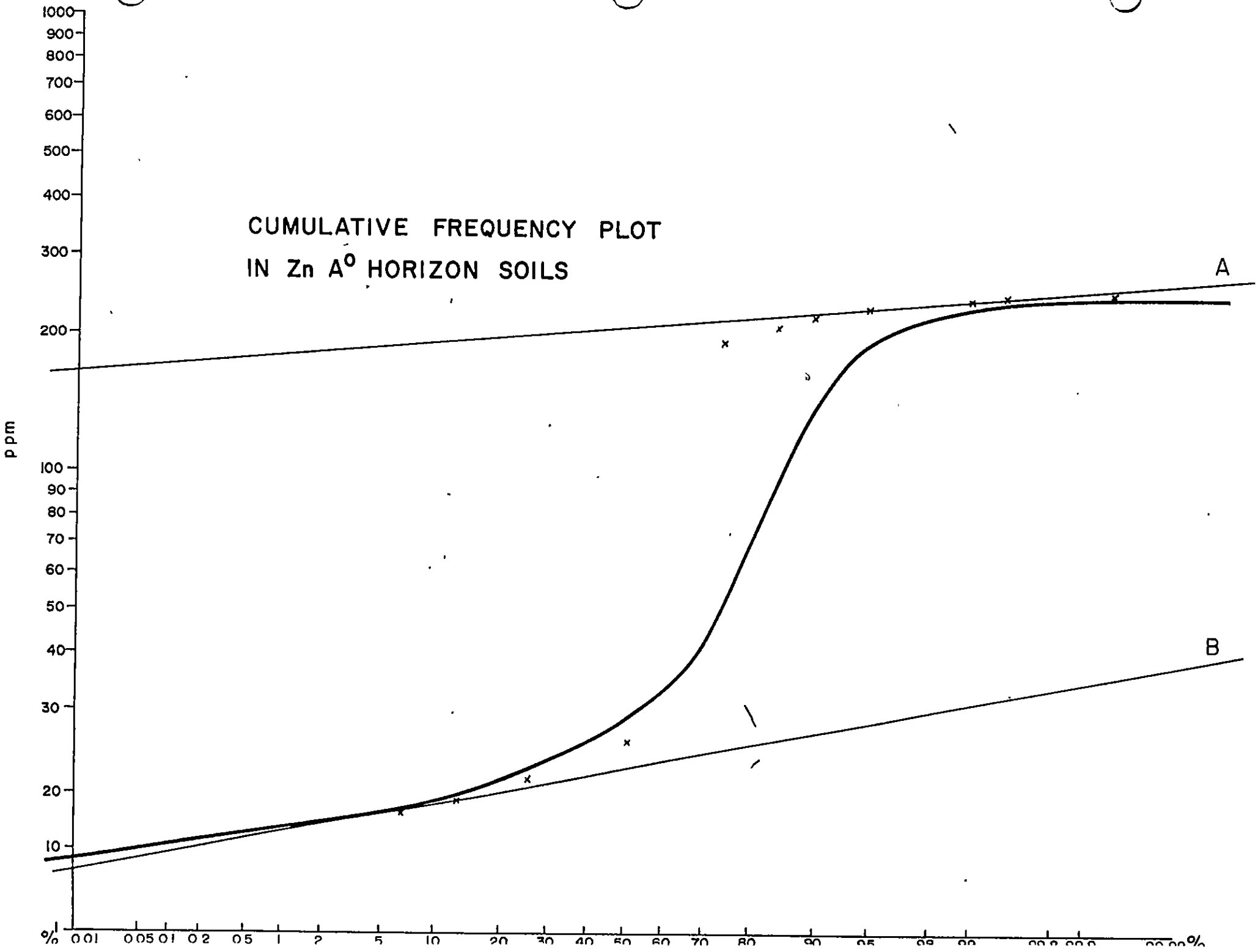
APPENDIX 1
SCHEDULE OF LANDS
COMMONWEALTH PROPERTY

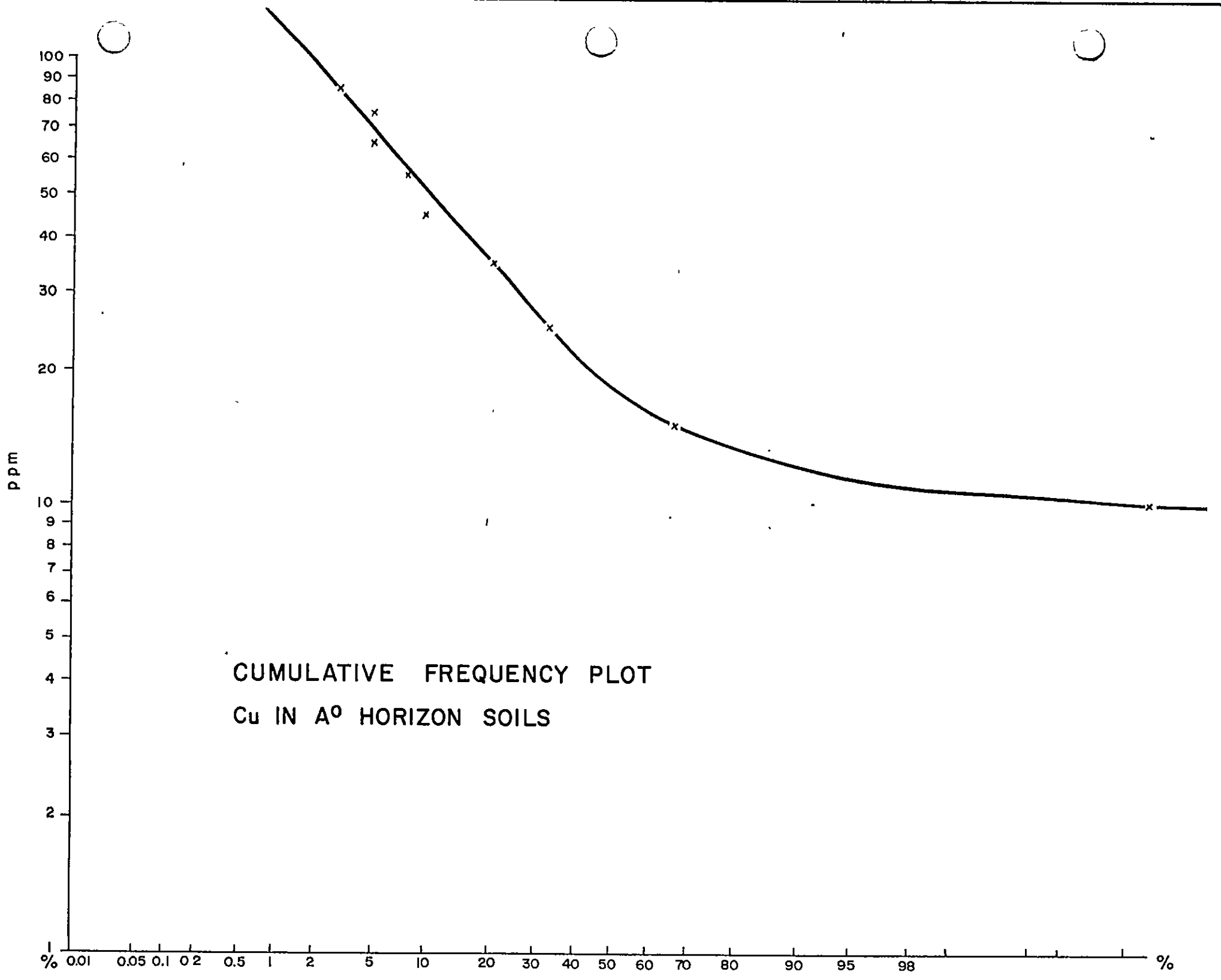
Name	Record No.	Units	Assessment Required By
L4171	137	1	83 01 22
L4172	138	1	83 01 22
L4173	139	1	83 01 22
L4176	140	1	83 01 22
Hooker	1993	20	83 06 19
Hidden Treasure	2221	20	83 10 01

APPENDIX 2

COMMONWEALTH SHOWING CUMULATIVE FREQUENCY GRAPHS

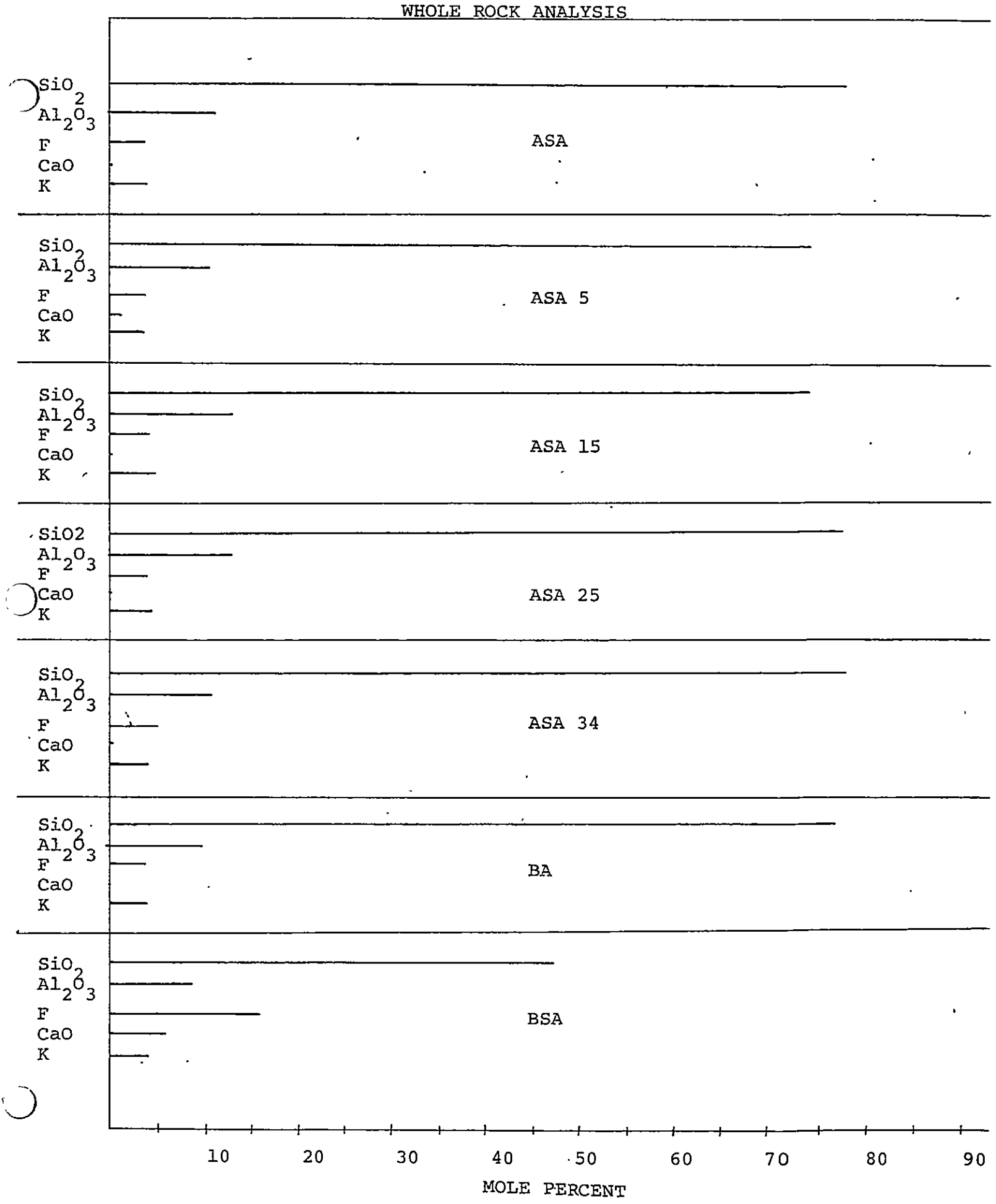

CUMULATIVE FREQUENCY PLOT
Pb IN A° HORIZON SOILS
ppm
1000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
10
% 0.01 0.05 0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9 99.99%

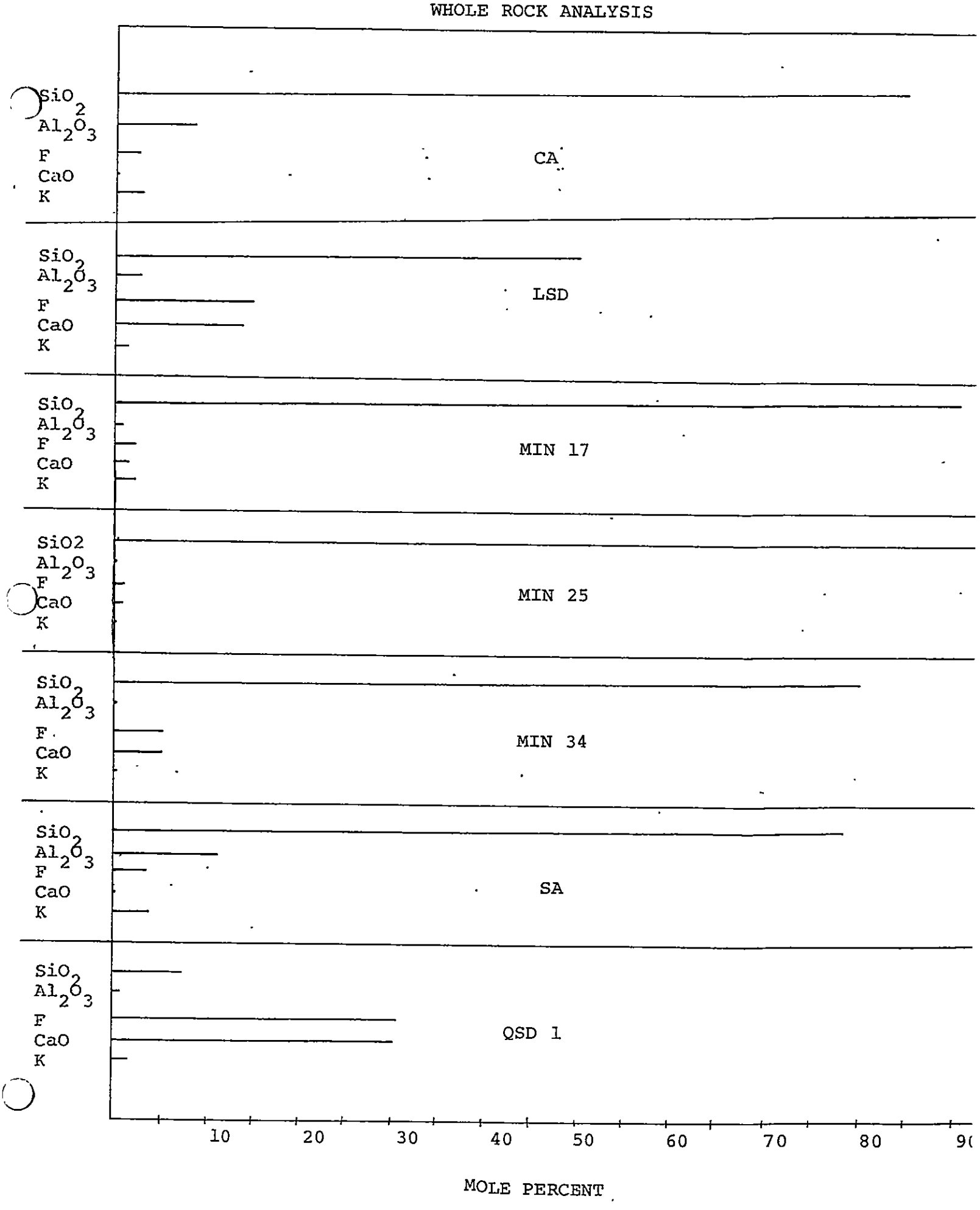

CUMULATIVE FREQUENCY PLOT
IN Zn A° HORIZON SOILS
A
B
ppm
1000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
10
%
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
%


ppm
100
90
80
70
60
50
40
30
20
10
9
8
7
6
5
4
3
2
1
% 0.01 0.05 0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 %
CUMULATIVE FREQUENCY PLOT
Cu IN A° HORIZON SOILS

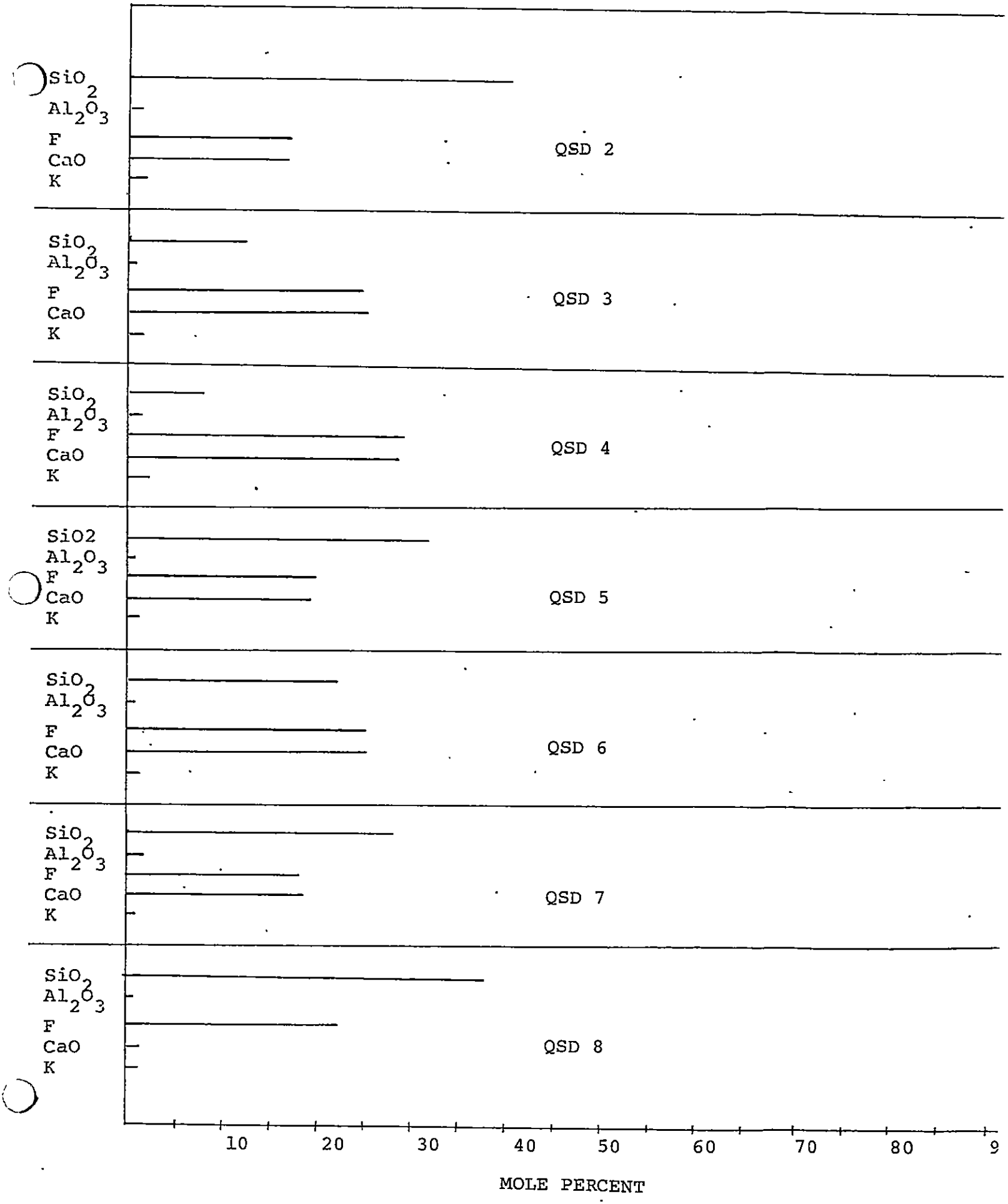
APPENDIX 3

COMMONWEALTH SHOWING BAR CHARTS AND ACK DIAGRAM

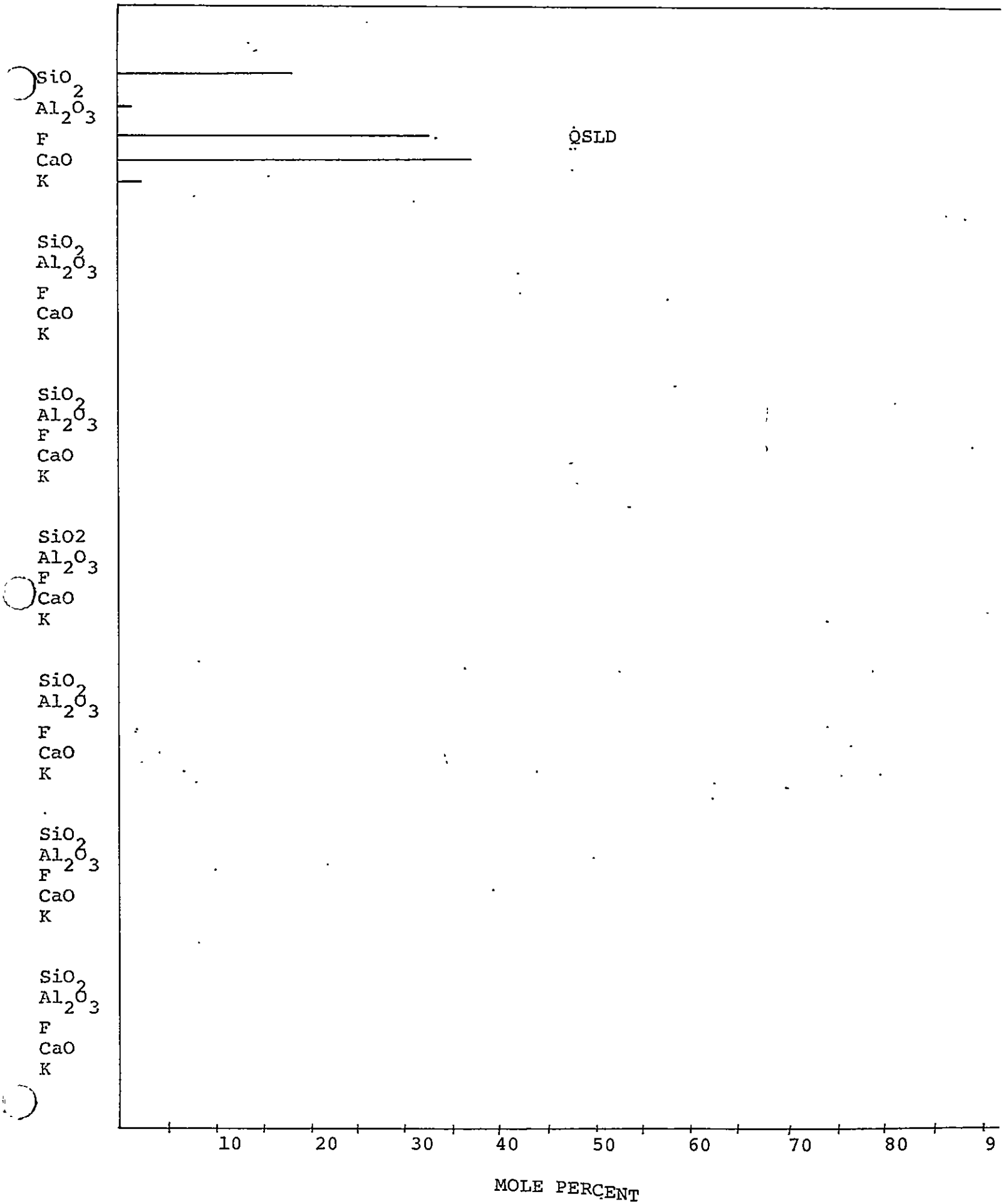

WHOLE ROCK ANALYSIS
SiO2
Al2O3
F
CaO
K
ASA
ASA 5
ASA 15
SiO2
Al2O3
F
CaO
K
ASA 25
ASA 34
BA
BSA
10
20
30
40
50
60
70
80
90
MOLE PERCENT

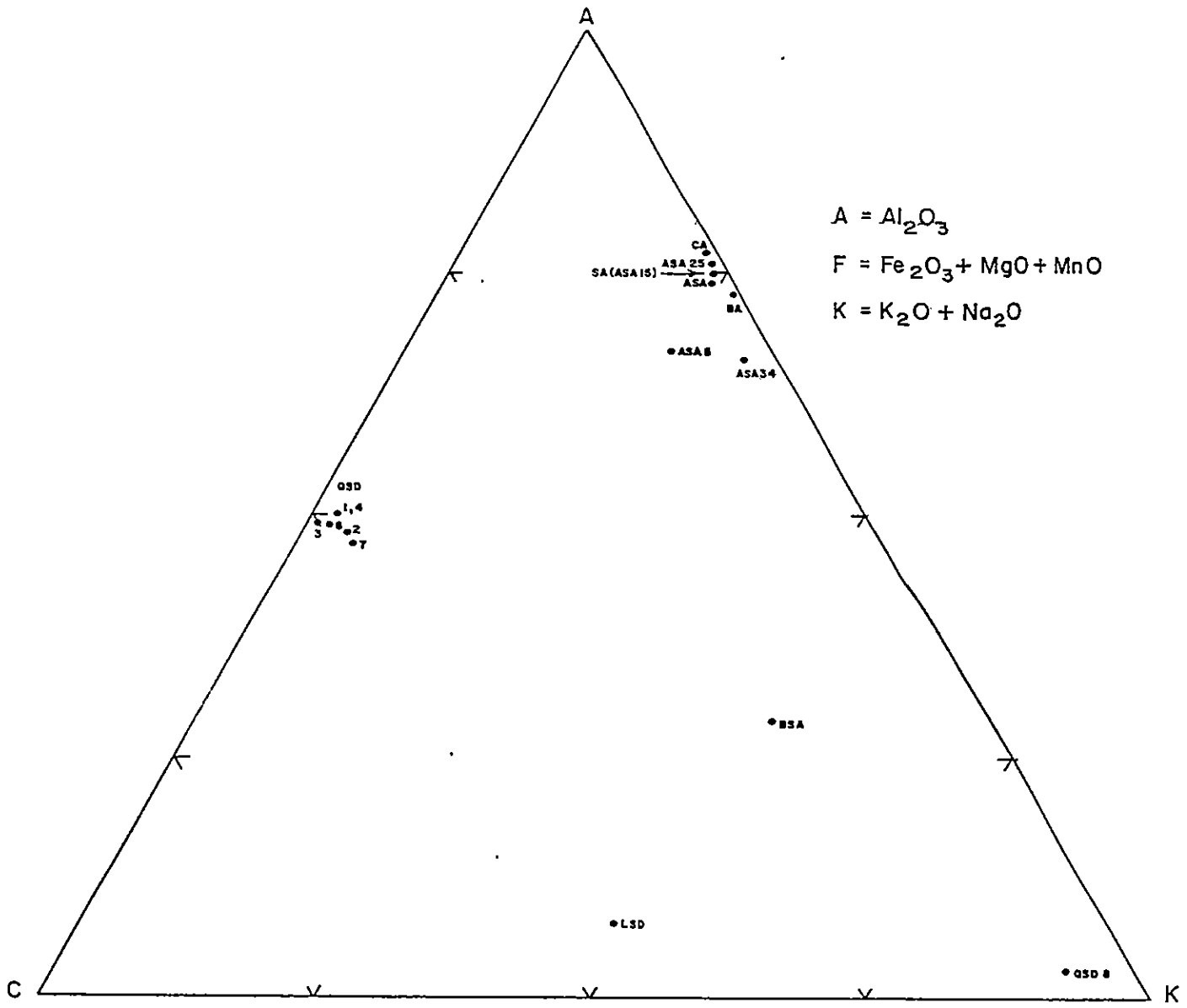

WHOLE ROCK ANALYSIS
SiO2
Al2O3
F
CaO
K
CA
LSD
MIN 17
MIN 25
MIN 34
SA
QSD 1
10
20
30
40
50
60
70
80
MOLE PERCENT

WHOLE ROCK ANALYSIS



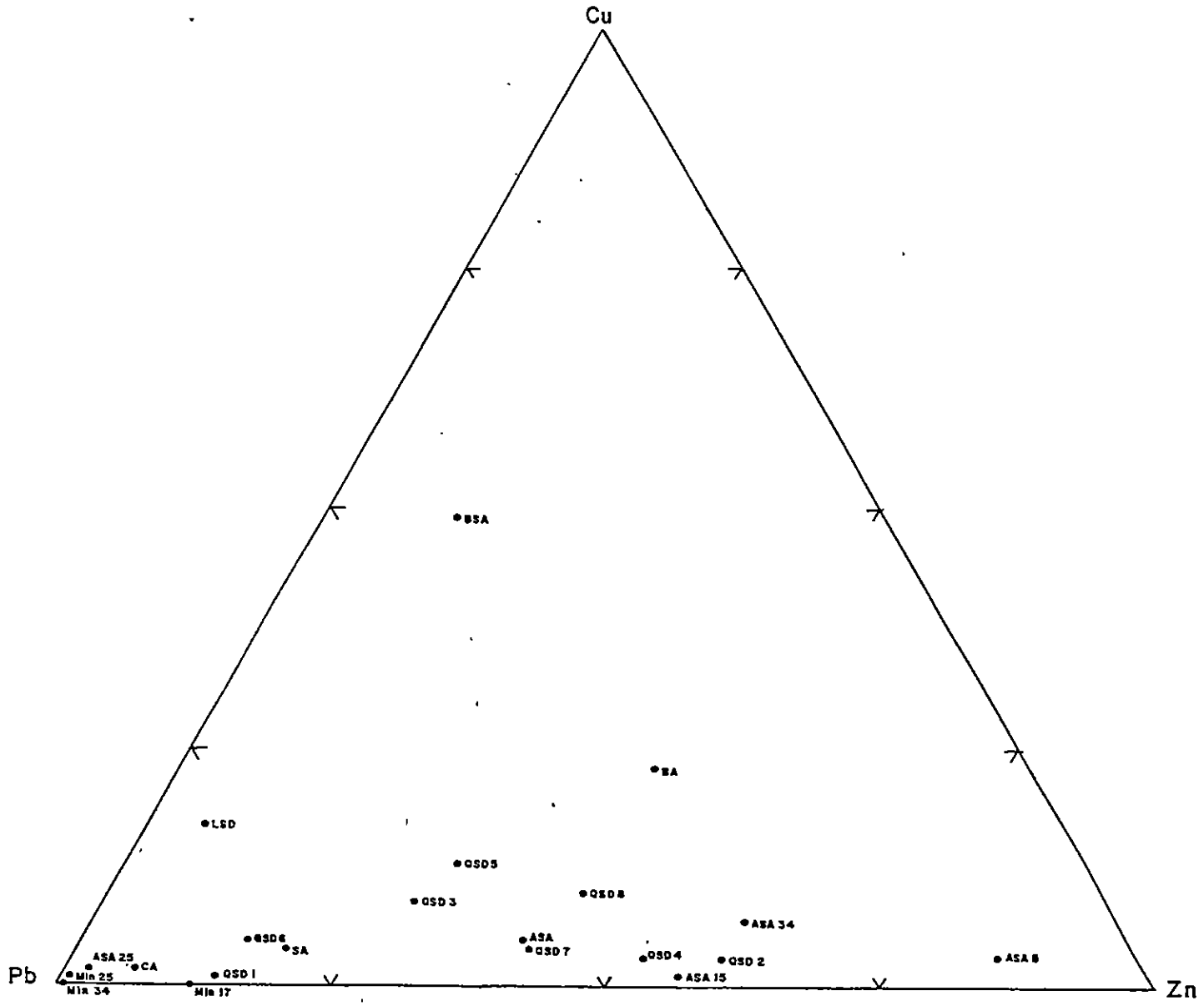
WHOLE ROCK ANALYSIS

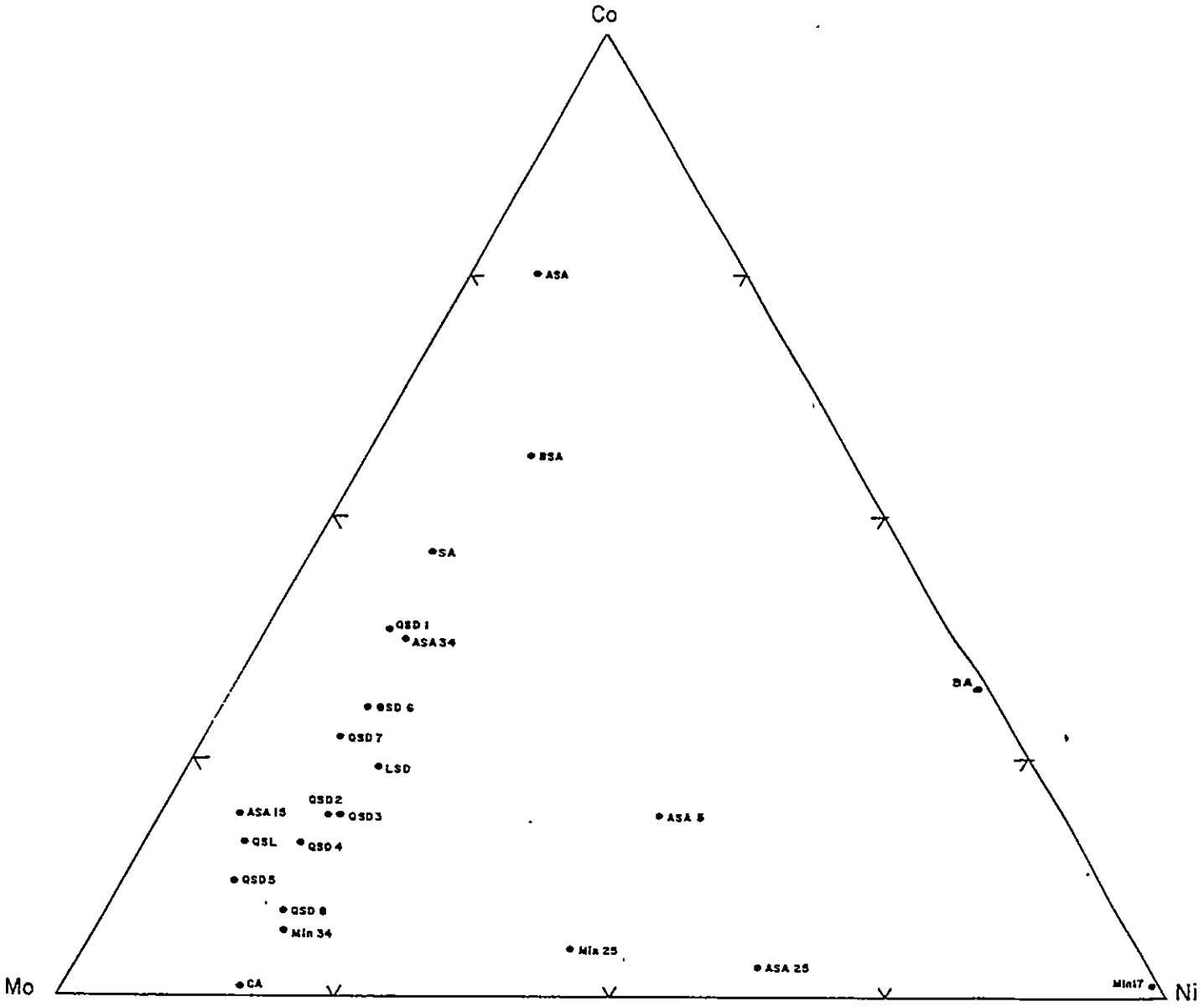



A
C
K
A = Al_2O_3
F = Fe_2O_3 + MgO + MnO
K = K_2O + Na_2O
CA
ASA 25
SA(ASA 15)
ASA 7
BA
ASA 6
ASA 34
QSD
1,4
3
6
2
7
BSA
LSD
QSD 8

APPENDIX 4

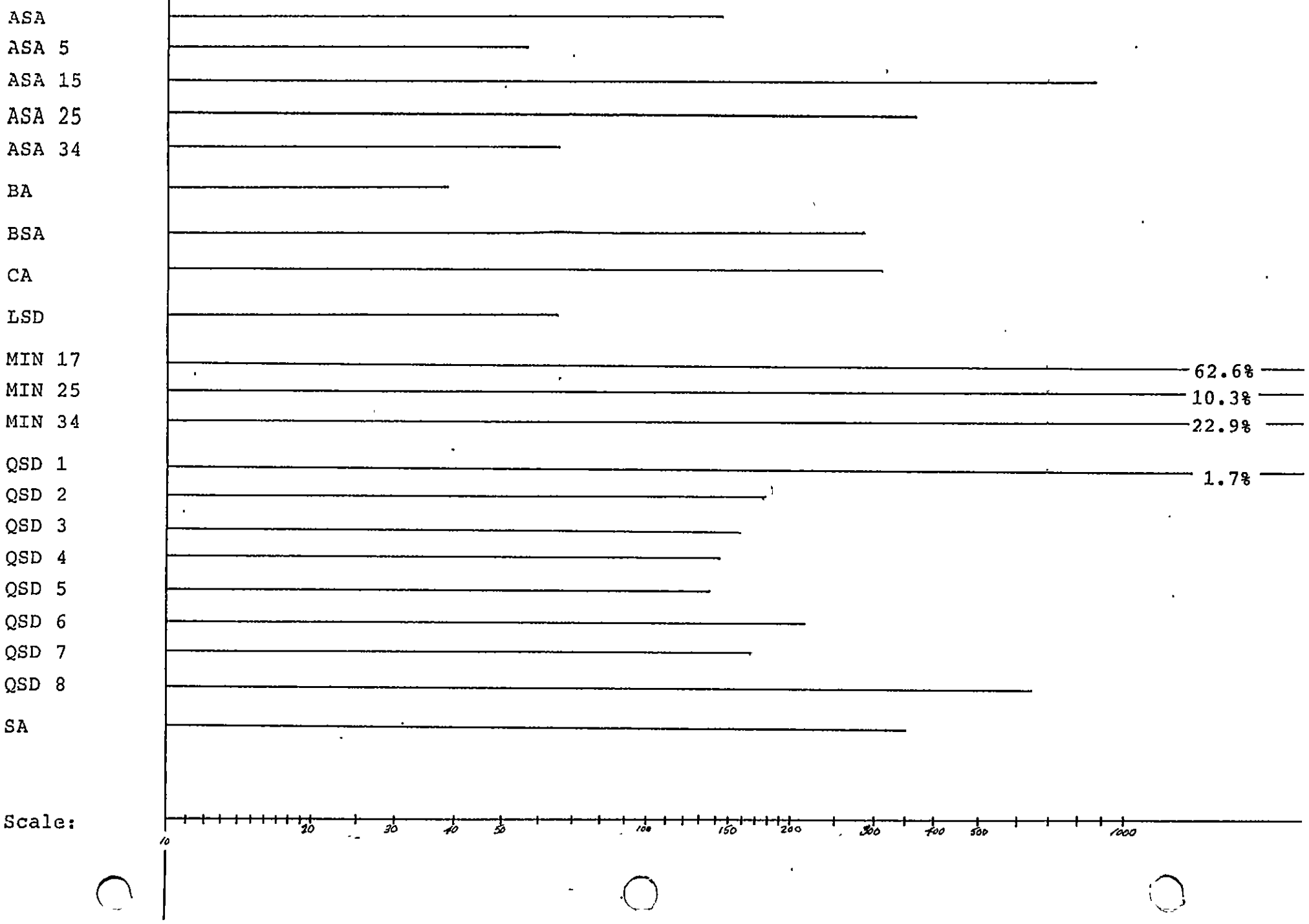
COMMONWEALTH SHOWING
TRIANGULAR COORDINATE GRAPHS
TRACE ELEMENT BAR CHARTS

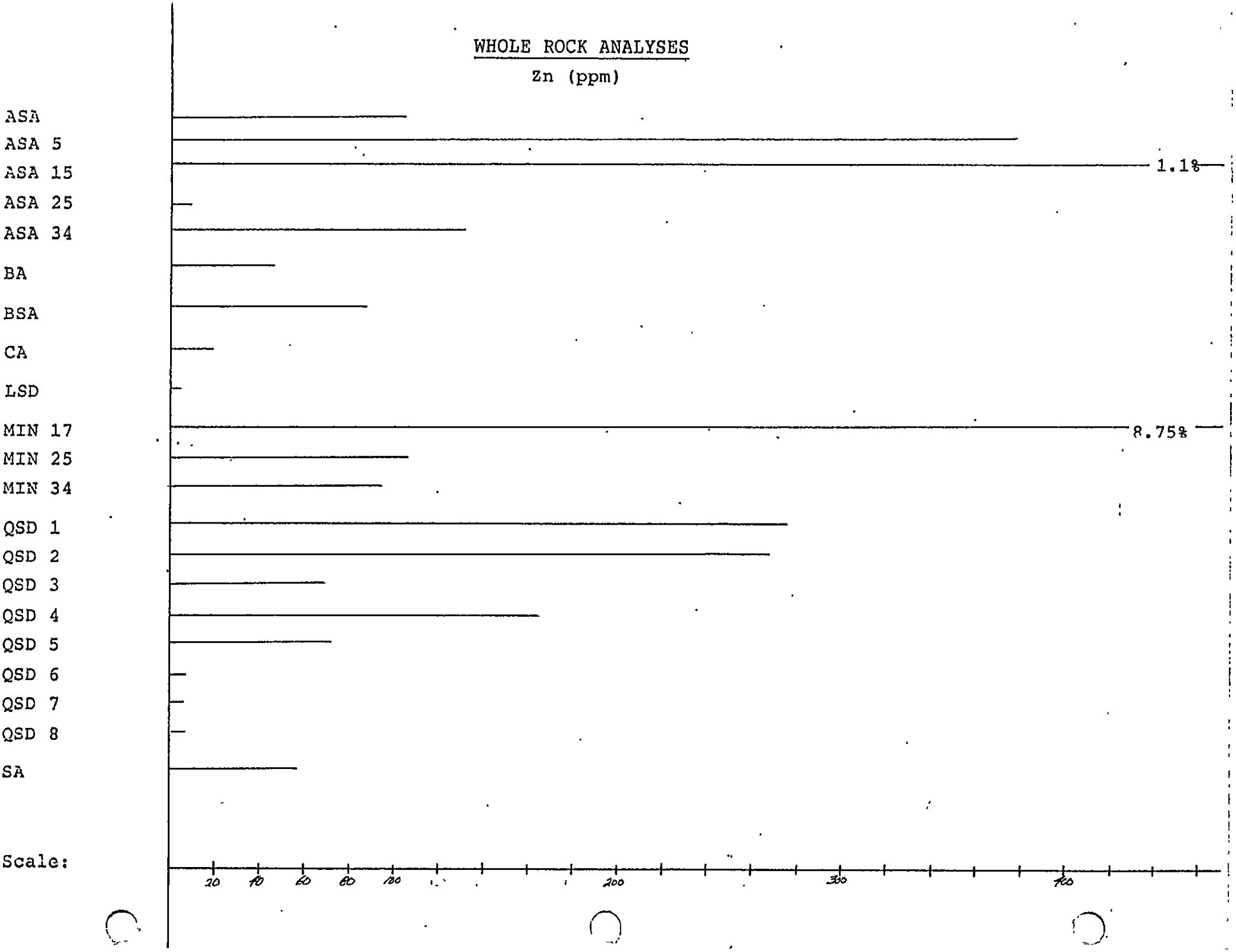

Cu
Pb
Zn
BSA
BA
LSD
QSD 5
QSD 8
QSD 3
ASA 34
ASA
QSD 7
QSD 6
SA
ASA 25
CA
Min 25
Min 34
QSD 1
Min 17
QSD 4
QSD 2
ASA 15
ASA 8


Co
Mo
Ni
ASA
BSA
SA
QSD 1
ASA 34
BA
QSD 6
QSD 7
LSD
QSD 2
ASA 15
QSD 3
ASA 5
QSL
QSD 4
QSD 5
QSD 8
Min 34
Mia 25
ASA 25
CA
Min17

WHOLE ROCK ANALYSES

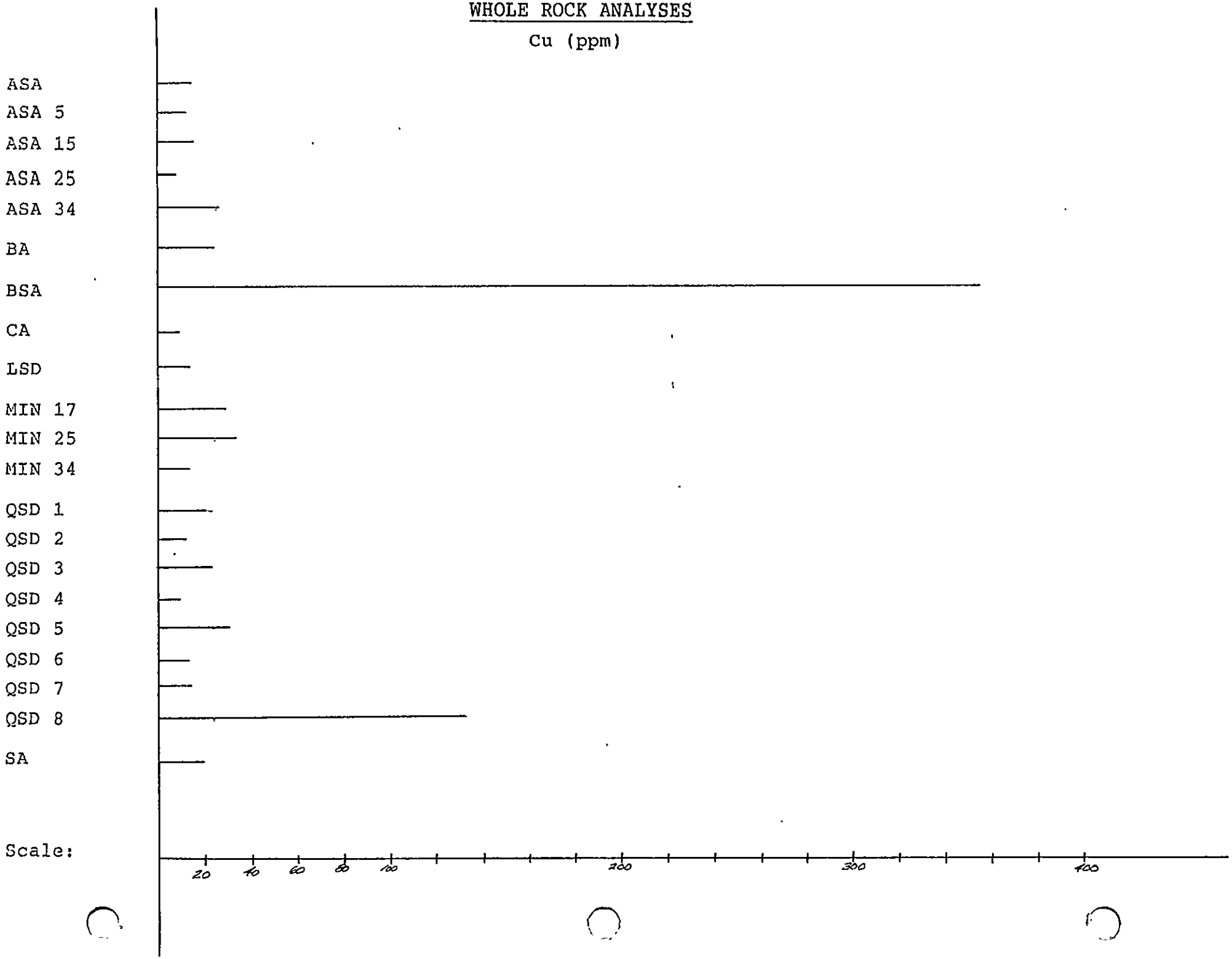
Pb (ppm)




WHOLE ROCK ANALYSES
Zn (ppm)
ASA
ASA 5
ASA 15
ASA 25
ASA 34
BA
BSA
CA
LSD
MIN 17
MIN 25
MIN 34
QSD 1
QSD 2
QSD 3
QSD 4
QSD 5
QSD 6
QSD 7
QSD 8
SA
1.1%
8.75%
Scale:
20
40
60
80
100
200
300
400

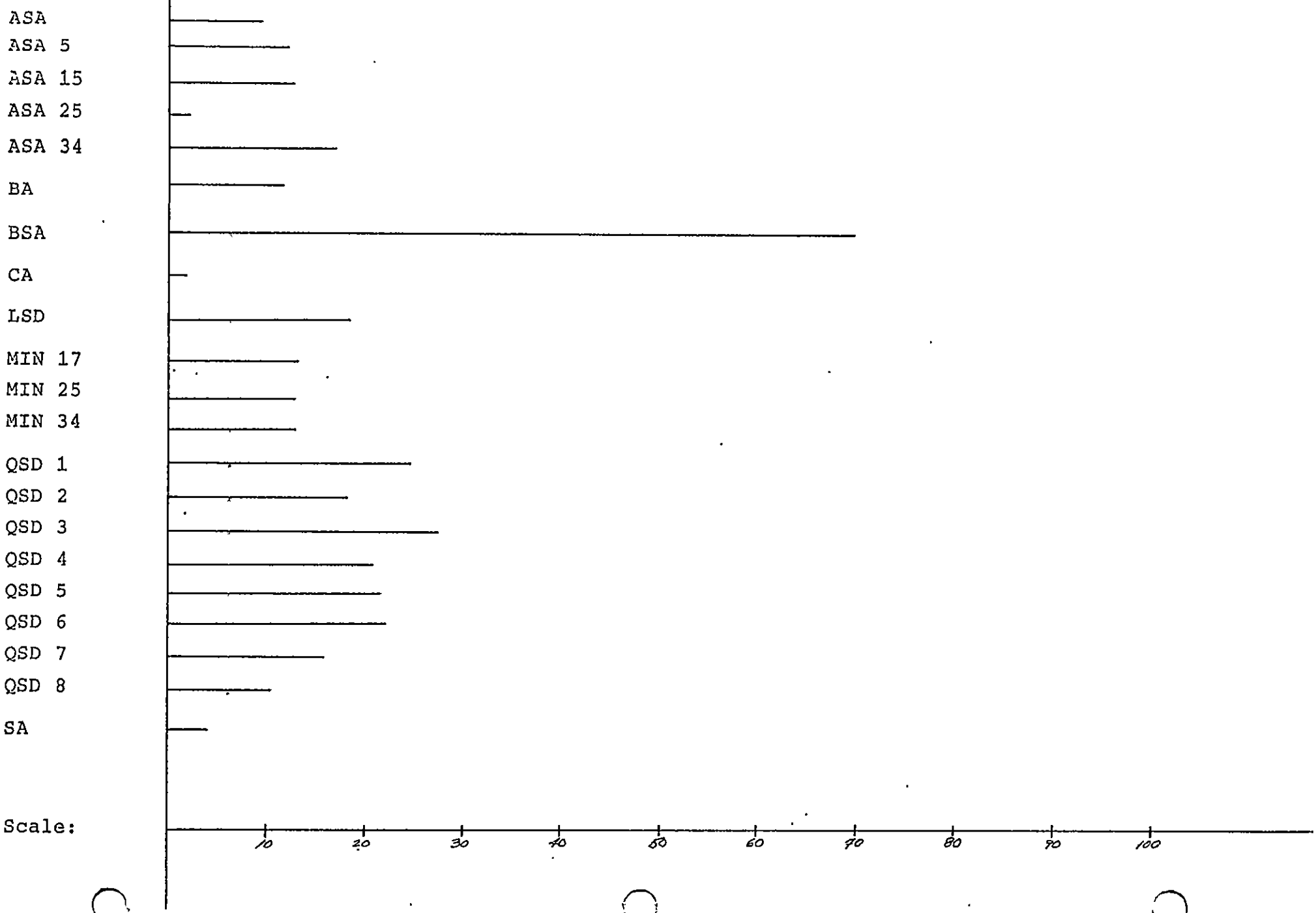
WHOLE ROCK ANALYSES

Cu (ppm)



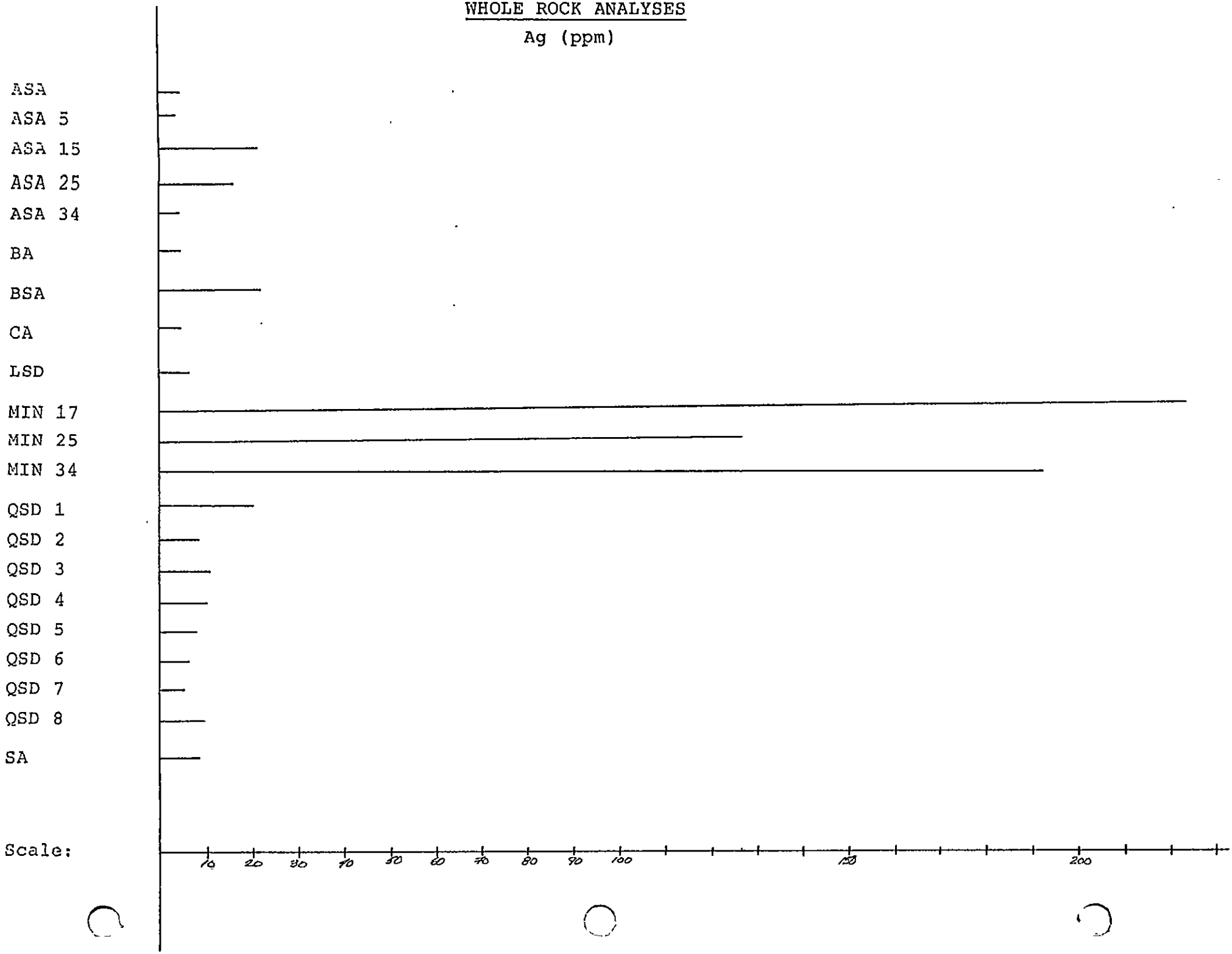
WHOLE ROCK ANALYSES

Ni (ppm)



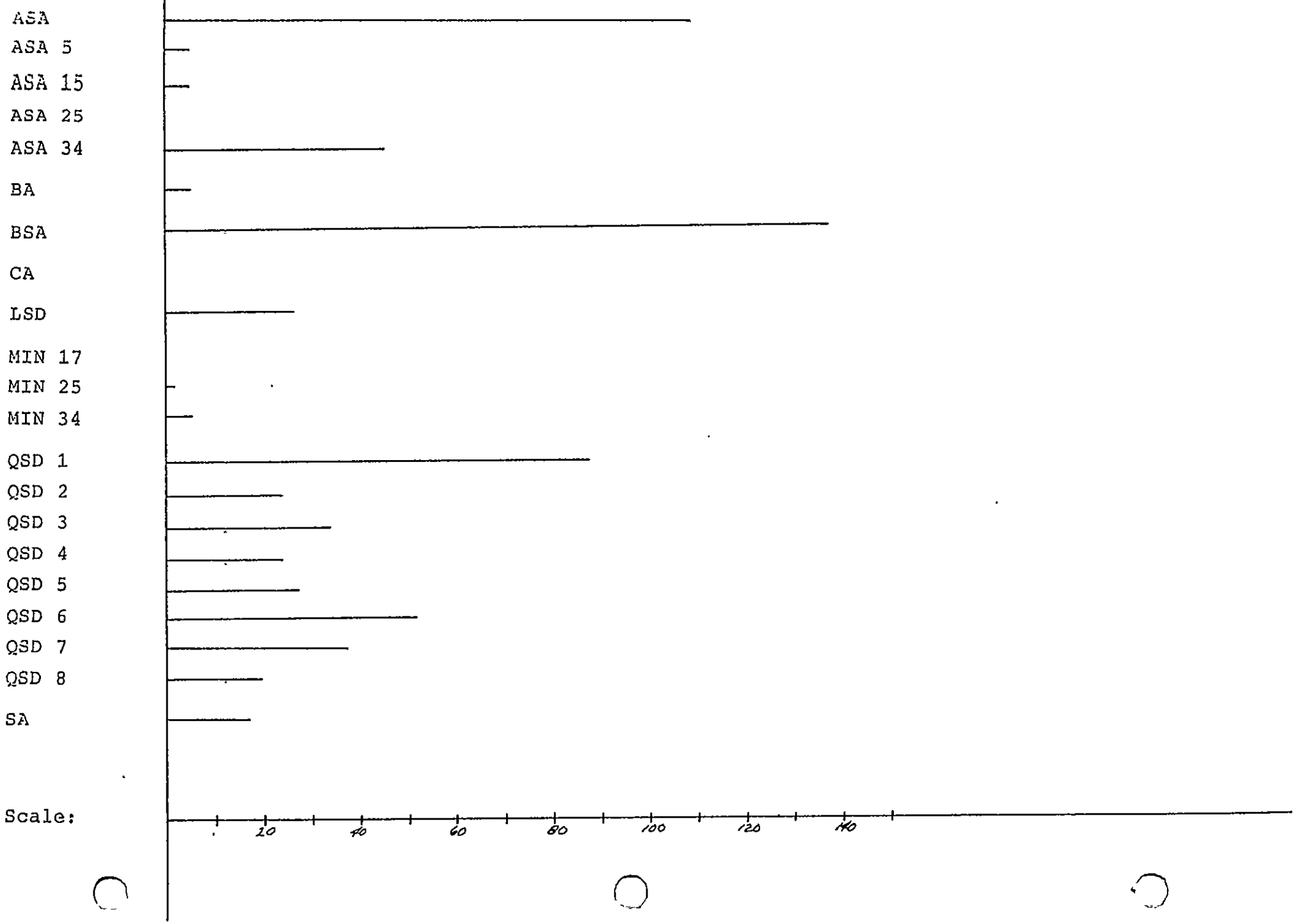
WHOLE ROCK ANALYSES

Ag (ppm)



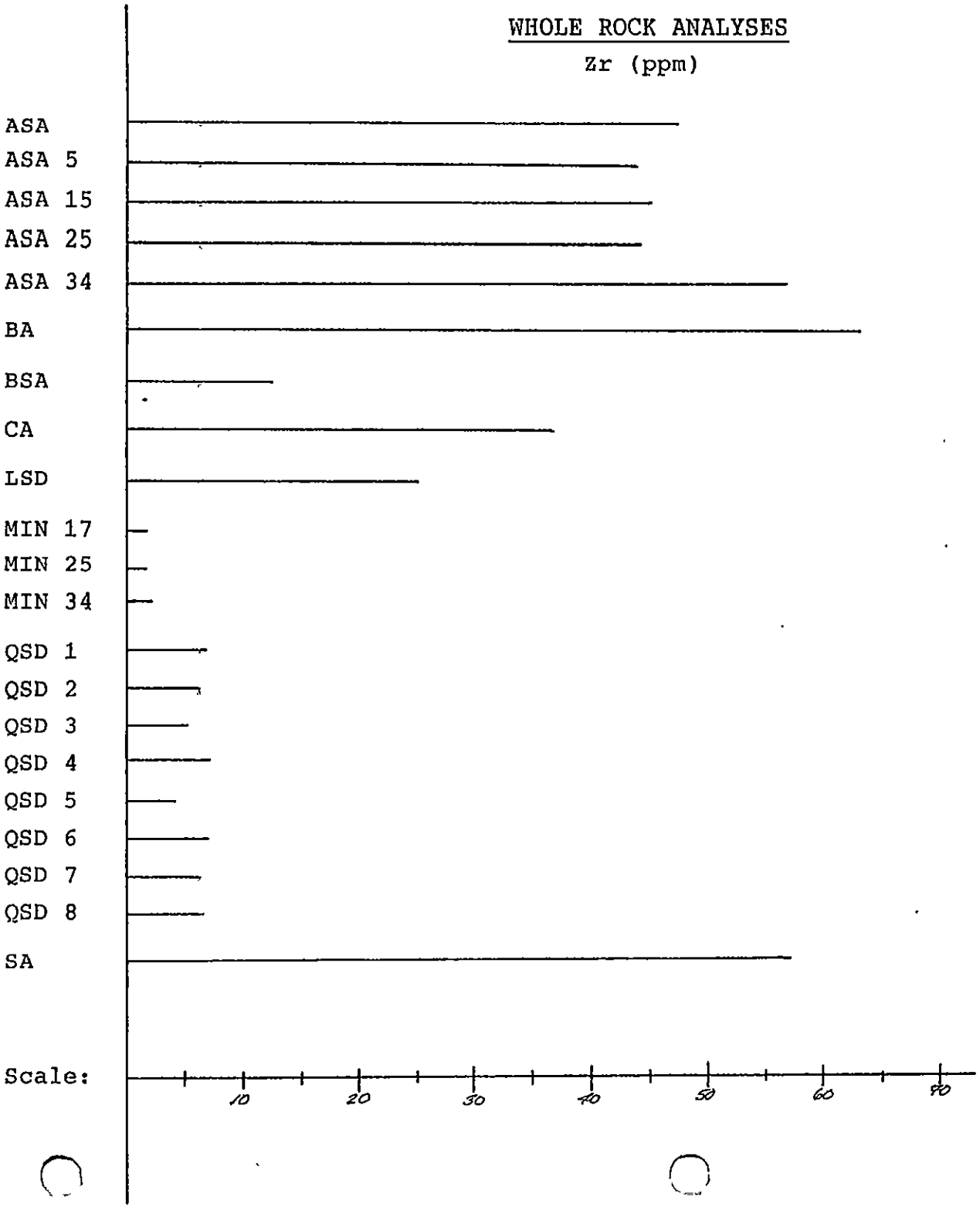
WHOLE ROCK ANALYSES

Co (ppm)



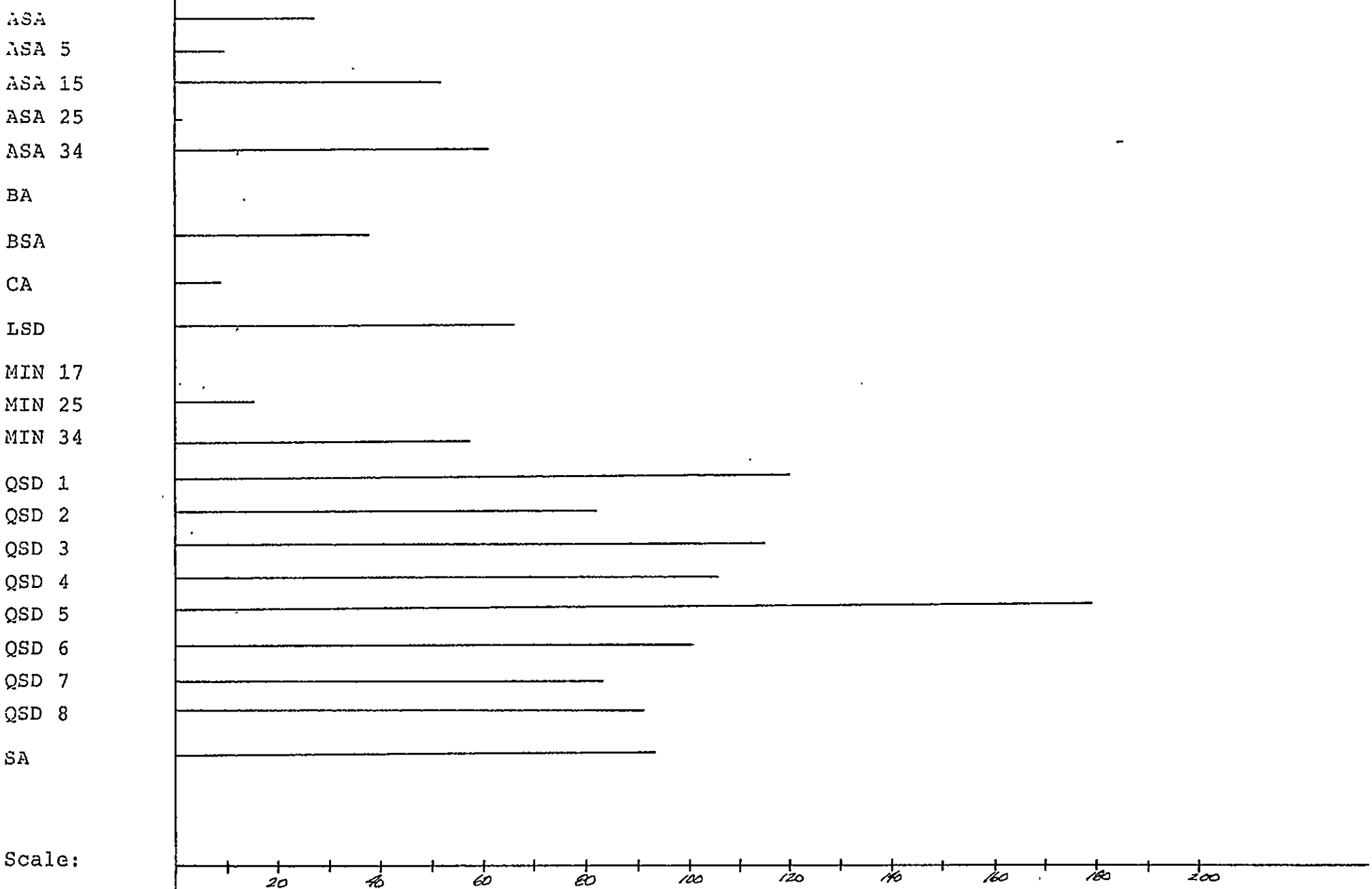
WHOLE ROCK ANALYSES

Zr (ppm)



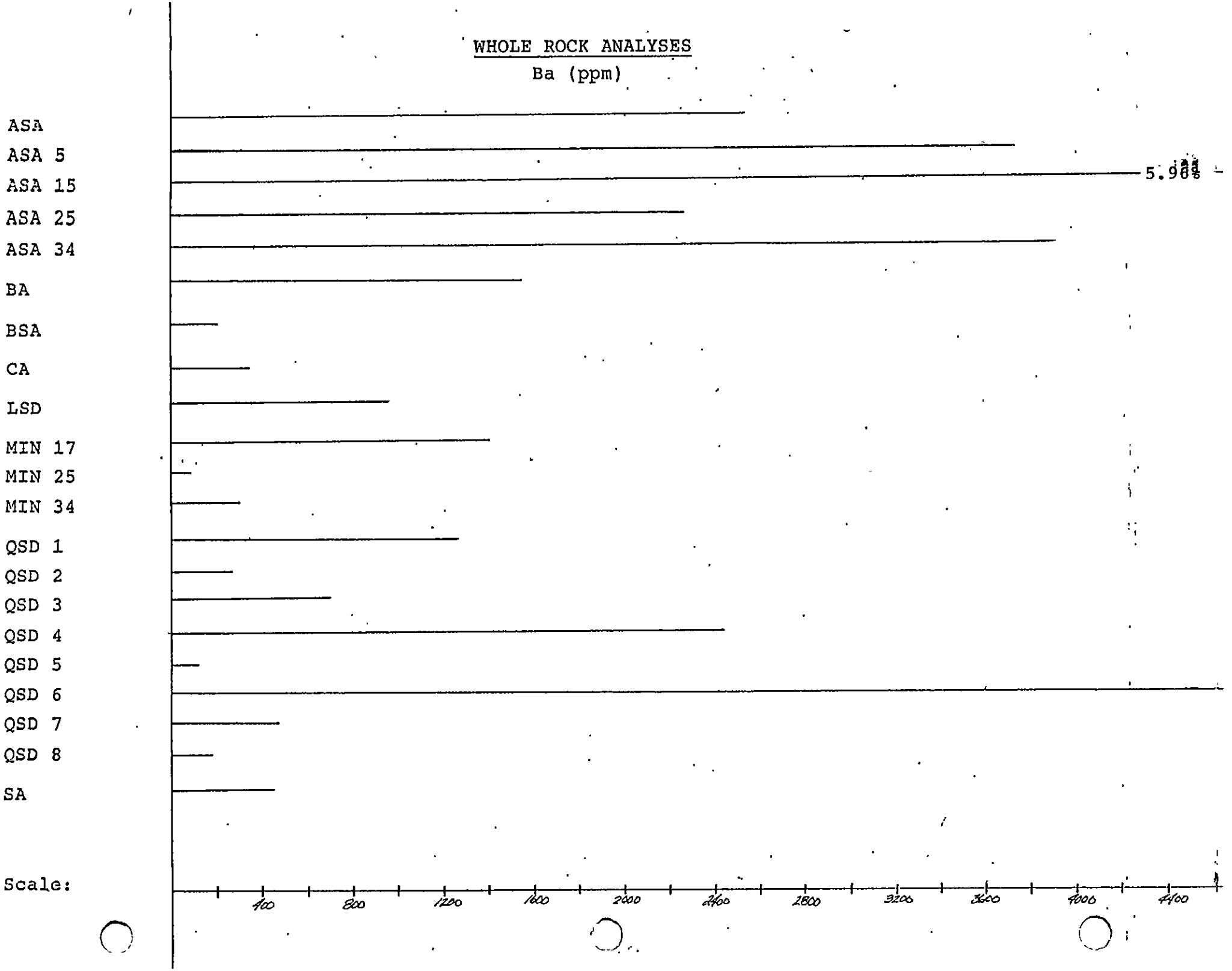
WHOLE ROCK ANALYSES

Mo (ppm)



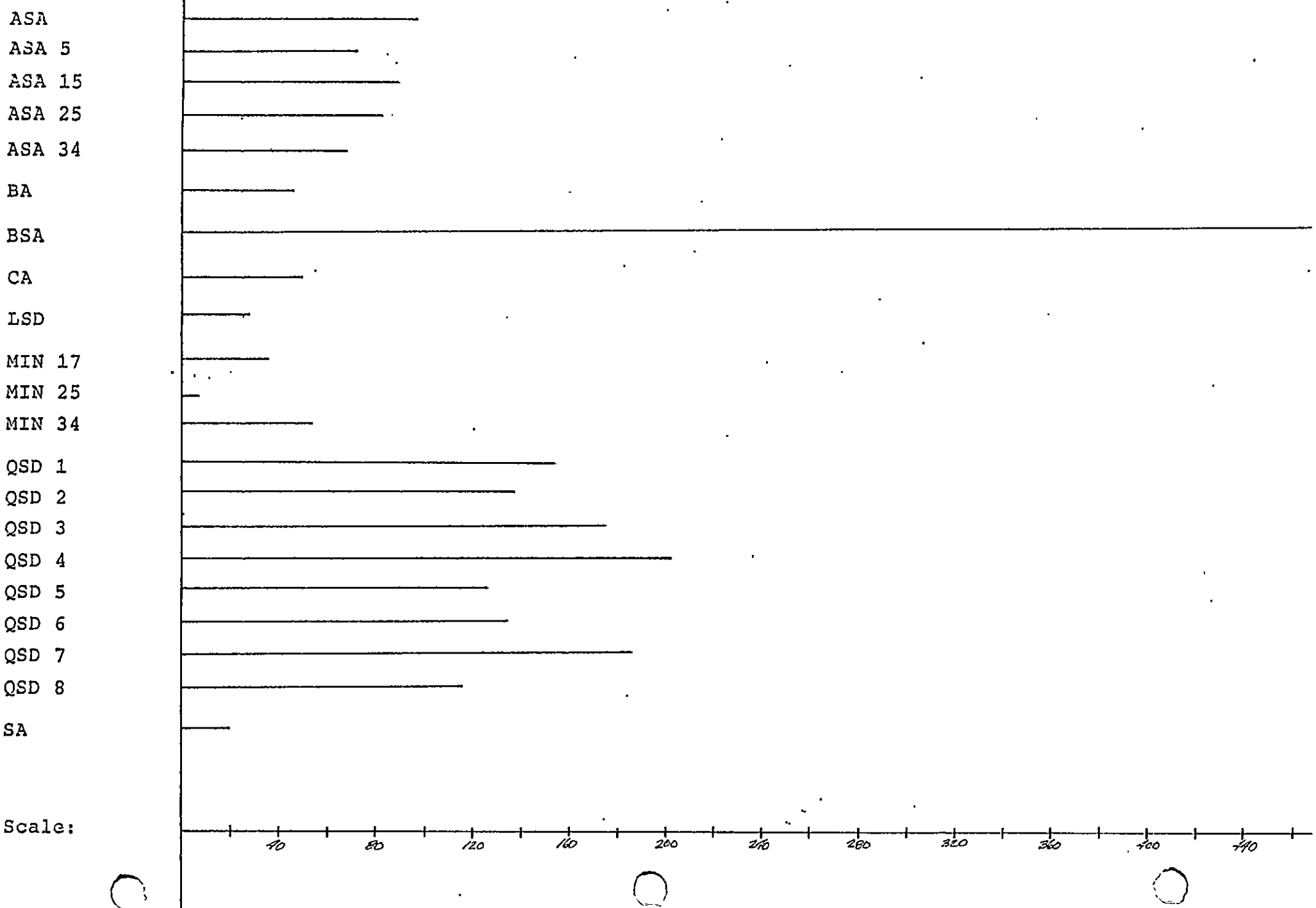
WHOLE ROCK ANALYSES

Ba (ppm)



WHOLE ROCK ANALYSES

Sr (ppm)



APPENDIX 5

GEOCHEMICAL PROCEDURES

APPENDIX 5
GEOCHEMICAL PROCEDURES

Stream Sampling

Silt samples were collected in Kraft paper bags at 50 m intervals on the property drainage system. Pertinent geological, topographic and physiographic information was recorded on data sheets for later computer analysis.

Trench Sampling

Where possible, rock-chip samples were taken in 50 cm channels across the rock face. Otherwise a representative grab sample was collected. Pertinent geological information was recorded for each trench sampled.

Analytical Method

All samples underwent the following procedures:

Stage	Silts & Soils	Rock-chips
Preparation	Drying	Crushing
Seiving	-80 Mesh	-200 Mesh
Dissolution	Perchloric/nitric	Perchloric/nitric
Analysis	Atomic Absorption	Atomic Absorption

Analysis was performed by TerraMin Research Labs Ltd. of Calgary.

APPENDIX 6

DESCRIPTIVE STATISTICS

DESCRIPTIVE STATISTICS

VARIABLE: CW SILT COPPER SAMPLE SIZE (N) = 30

SAMPLE STATISTICS:

MEAN = 29.5333		RANGE	= 49
VARIANCE	= 101.915	MINIMUM	= 15
STD. DEV.	= 10.0953	MAXIMUM	= 64

UNBIASED ESTIMATES OF POPULATION PARAMETERS:

VARIANCE	= 105.429	STD. DEV.	= 10.2679

DATA DISTRIBUTION COEFFICIENTS:

SKEWNESS	= 1.18919	KURTOSIS	= 2.36943

DESCRIPTIVE STATISTICS

VARIABLE: CW SILT LEAD SAMPLE SIZE (N) = 31

SAMPLE STATISTICS:

MEAN = 149.161		RANGE	= 855
VARIANCE	= 33691	MINIMUM	= 25
STD. DEV.	= 183.551	MAXIMUM	= 880

UNBIASED ESTIMATES OF POPULATION PARAMETERS:

VARIANCE	= 34814	STD. DEV.	= 186.585

DATA DISTRIBUTION COEFFICIENTS:

SKEWNESS	= 2.34717	KURTOSIS	= 5.80466

DESCRIPTIVE STATISTICS

VARIABLE: CW SILT ZINC SAMPLE SIZE (N) = 31

SAMPLE STATISTICS:

MEAN = 270.645		RANGE	= 1593
VARIANCE	= 80636.6	MINIMUM	= 77
STD. DEV.	= 283.966	MAXIMUM	= 1670

UNBIASED ESTIMATES OF POPULATION PARAMETERS:

VARIANCE	= 83324.5	STD. DEV.	= 288.66

DATA DISTRIBUTION COEFFICIENTS:

SKEWNESS	= 3.8696	KURTOSIS	= 16.1273

DESCRIPTIVE STATISTICS

VARIABLE: CW SILT NICKEL SAMPLE SIZE (N) = 31

SAMPLE STATISTICS:

MEAN = 27.6774		RANGE	= 96
VARIANCE	= 423.831	MINIMUM	= 12
STD. DEV.	= 20.5872	MAXIMUM	= 108

UNBIASED ESTIMATES OF POPULATION PARAMETERS:

VARIANCE	= 437.959	STD. DEV.	= 20.9275

DATA DISTRIBUTION COEFFICIENTS:

SKEWNESS	= 2.71658	KURTOSIS	= 7.12543

DESCRIPTIVE STATISTICS

VARIABLE: CW SILT COBALT SAMPLE SIZE (N) = 31

SAMPLE STATISTICS:

MEAN = 13.5806		RANGE	= 36
VARIANCE	= 62.0501	MINIMUM	= 6
STD. DEV.	= 7.87719	MAXIMUM	= 42

UNBIASED ESTIMATES OF POPULATION PARAMETERS:

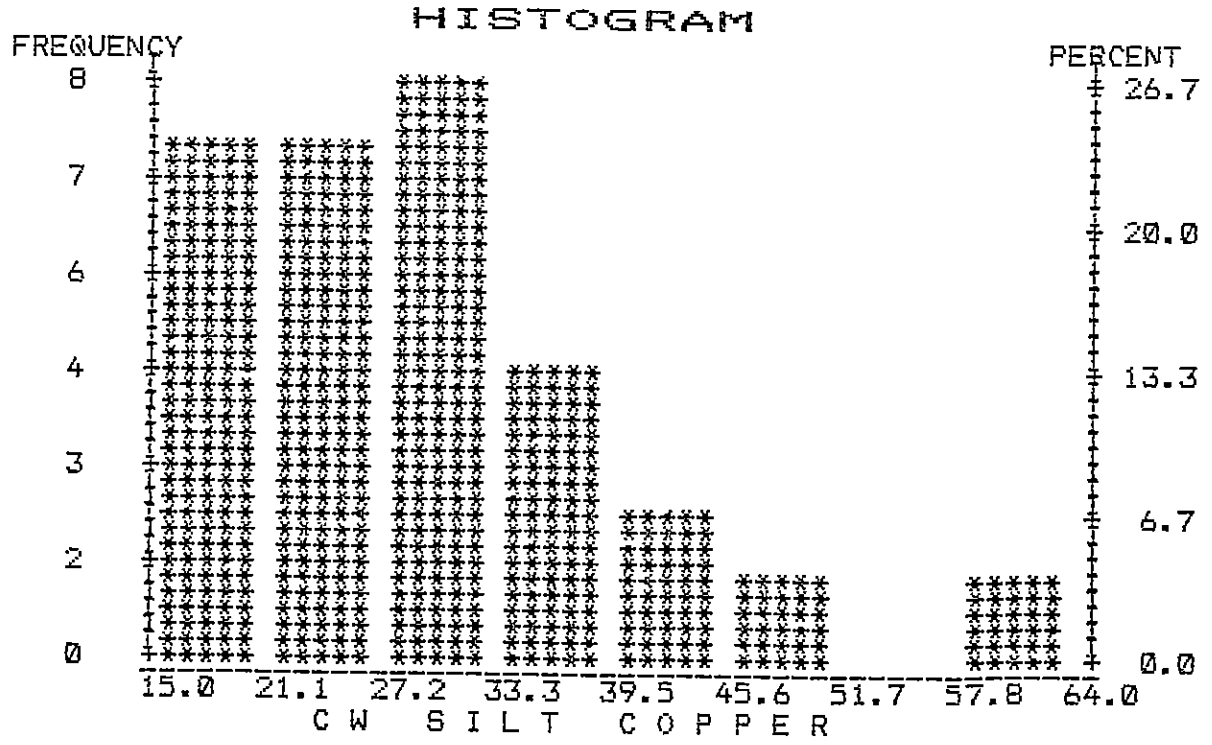
VARIANCE	= 64.1184	STD. DEV.	= 8.0074

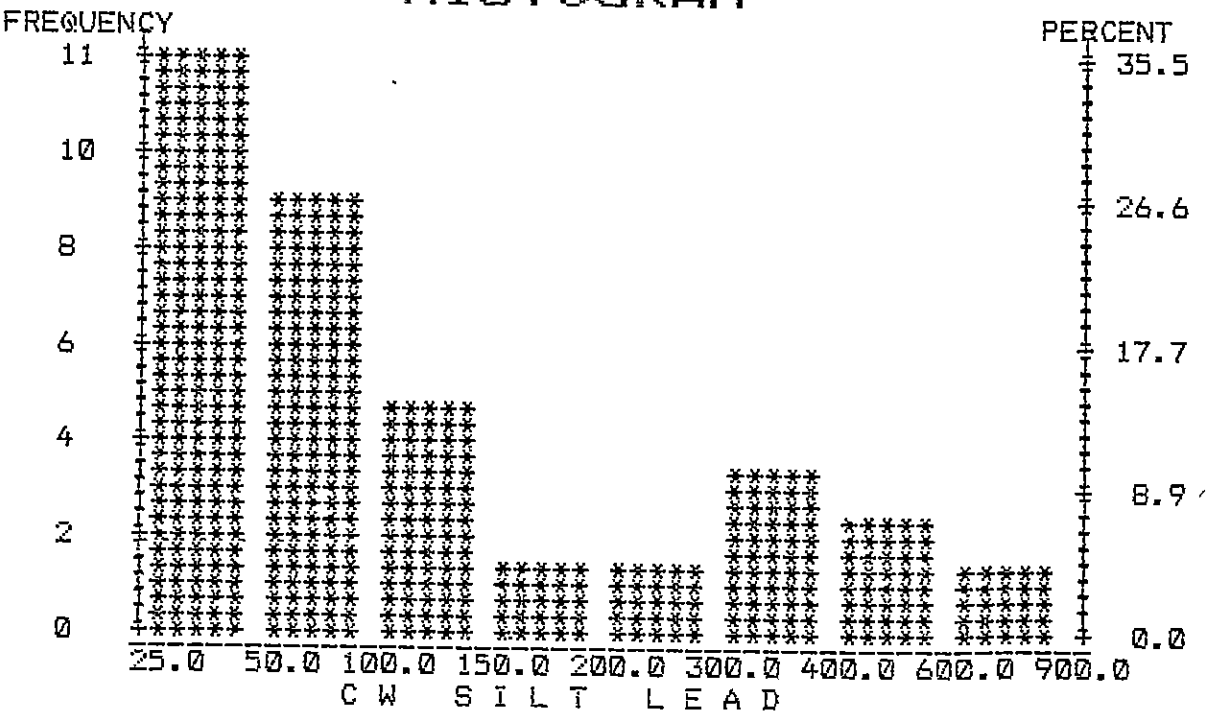
DATA DISTRIBUTION COEFFICIENTS:

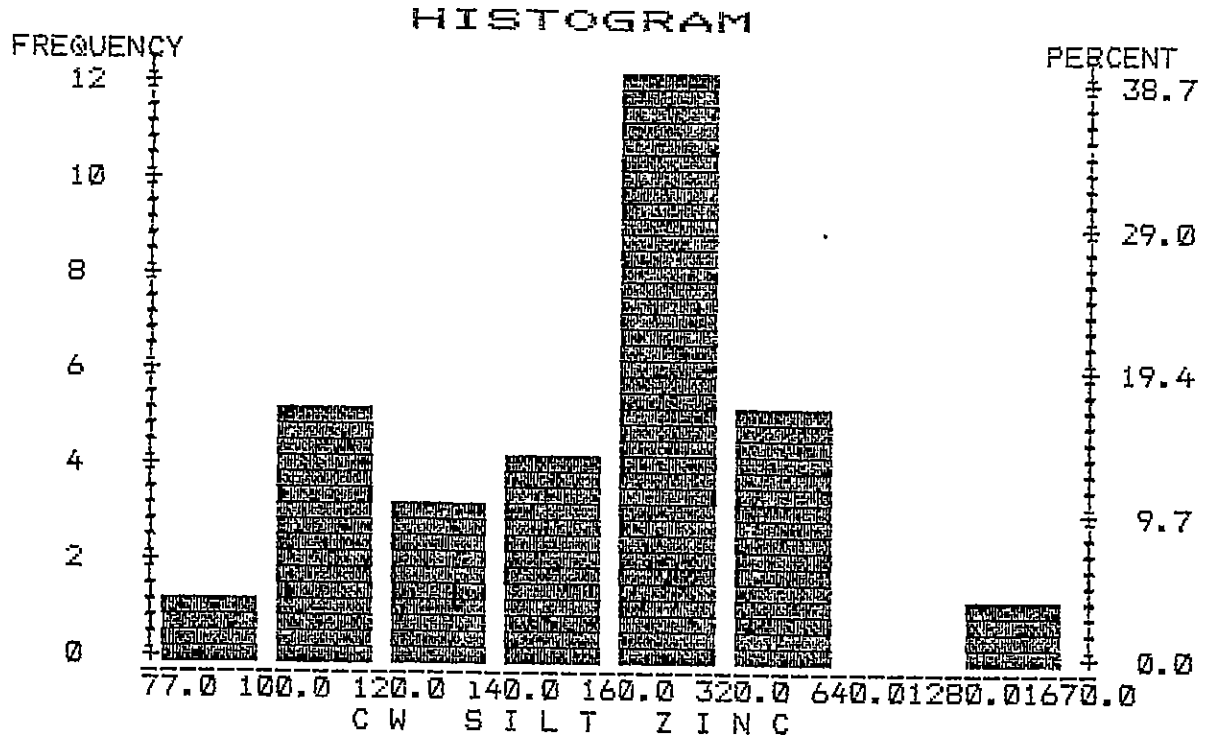
SKEWNESS	= 2.52698	KURTOSIS	= 6.07806

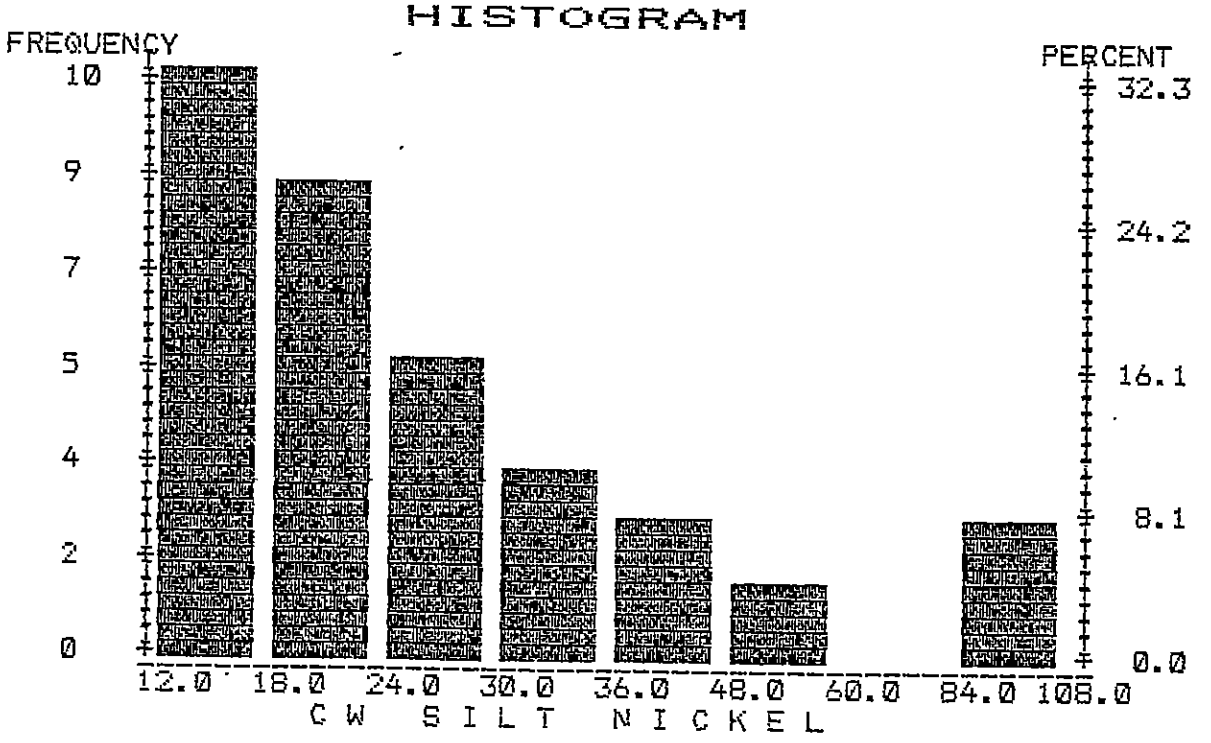
APPENDIX 7

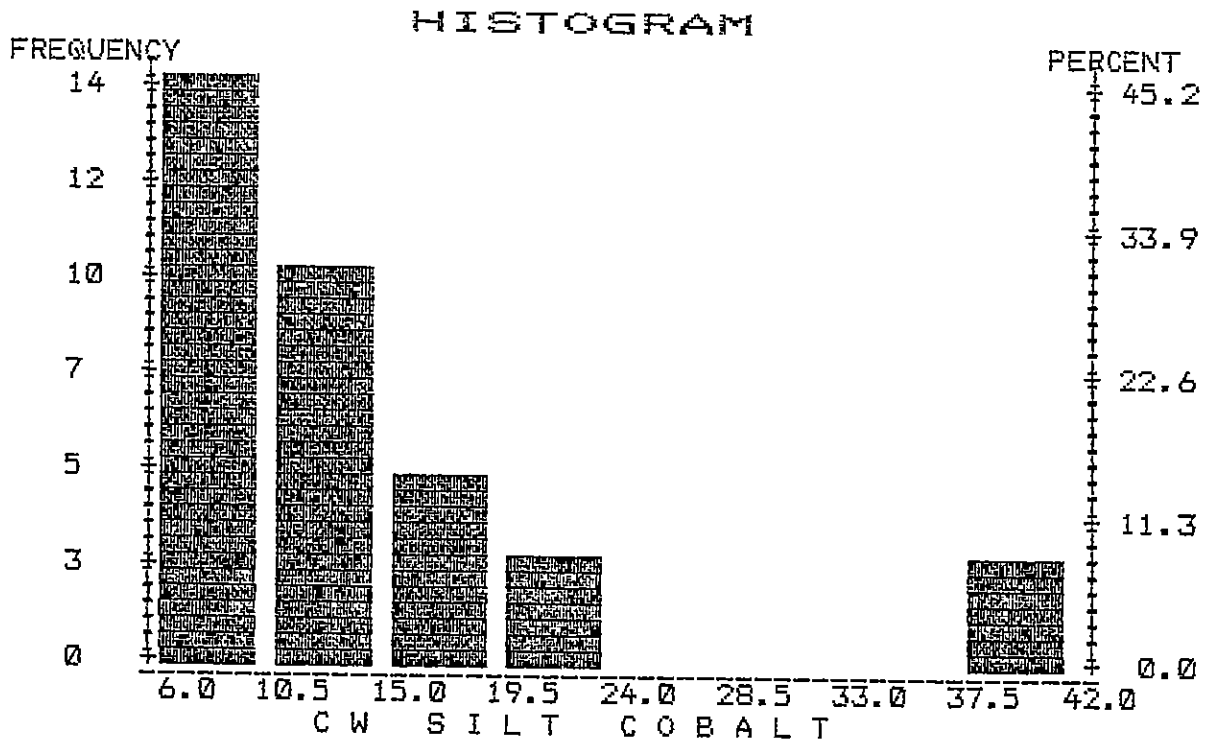
HISTOGRAMS


HISTOGRAM
FREQUENCY
PERCENT
8
7
6
4
3
2
0
26.7
20.0
13.3
6.7
0.0
15.0 21.1 27.2 33.3 39.5 45.6 51.7 57.8 64.0
CW SILT COPPER


HISTOGRAM
FREQUENCY
PERCENT
11
10
8
6
4
2
0
35.5
26.6
17.7
8.9
0.0
25.0 50.0 100.0 150.0 200.0 300.0 400.0 600.0 900.0
CW SILT LEAD


HISTOGRAM
FREQUENCY
PERCENT
12
10
8
6
4
2
0
38.7
29.0
19.4
9.7
0.0
77.0 100.0 120.0 140.0 160.0 320.0 640.0 1280.0 1670.0
C W S I L T Z I N C


HISTOGRAM
FREQUENCY
PERCENT
10
9
7
5
4
2
0
32.3
24.2
16.1
8.1
0.0
12.0 18.0 24.0 30.0 36.0 48.0 60.0 84.0 108.0
C W S I L T N I C K E L


HISTOGRAM
FREQUENCY
14
12
10
7
5
3
0
PERCENT
45.2
33.9
22.6
11.3
0.0
6.0
10.5
15.0
19.5
24.0
28.5
33.0
37.5
42.0
C W S I L T C O B A L T

APPENDIX 8

CUMULATIVE FREQUENCY PLOTS

F R E Q U E N C Y D I S T R I B U T I O N

DISTRIBUTION OF VARIABLE: CW SILT COPPER

INTERVAL			FREQUENCY	PERCENT	CUMULATIVE %
15.000	TO	19.999	5	16.7	16.7
20.000	TO	24.999	5	16.7	33.3
25.000	TO	29.999	5	16.7	50.0
30.000	TO	34.999	8	26.7	76.7
35.000	TO	39.999	3	10.0	86.7
40.000	TO	44.999	2	6.7	93.3
45.000	TO	49.999	1	3.3	96.7
50.000	TO	64.000	1	3.3	100.0
T O T A L			30	100.0	

F R E Q U E N C Y D I S T R I B U T I O N

DISTRIBUTION OF VARIABLE: CW SILT LEAD

INTERVAL			FREQUENCY	PERCENT	CUMULATIVE %
25.000	TO	49.999	11	35.5	35.5
50.000	TO	99.999	8	25.8	61.3
100.000	TO	149.999	4	12.9	74.2
150.000	TO	199.999	1	3.2	77.4
200.000	TO	249.999	0	0.0	77.4
250.000	TO	299.999	1	3.2	80.6
300.000	TO	349.999	2	6.5	87.1
350.000	TO	399.999	1	3.2	90.3
400.000	TO	549.999	2	6.5	96.8
550.000	TO	880.000	1	3.2	100.0
T O T A L			31	100.0	

F R E Q U E N C Y D I S T R I B U T I O N

DISTRIBUTION OF VARIABLE: CW SILT ZINC

INTERVAL			FREQUENCY	PERCENT	CUMULATIVE %
77.000	TO	119.999	6	19.4	19.4
120.000	TO	159.999	7	22.6	41.9
160.000	TO	199.999	3	9.7	51.6
200.000	TO	249.999	5	16.1	67.7
250.000	TO	299.999	1	3.2	71.0
300.000	TO	399.999	4	12.9	83.9
400.000	TO	499.999	2	6.5	90.3
500.000	TO	599.999	2	6.5	96.8
600.000	TO	699.999	0	0.0	96.8
700.000	TO	1670.000	1	3.2	100.0
T O T A L			31	100.0	

F R E Q U E N C Y D I S T R I B U T I O N

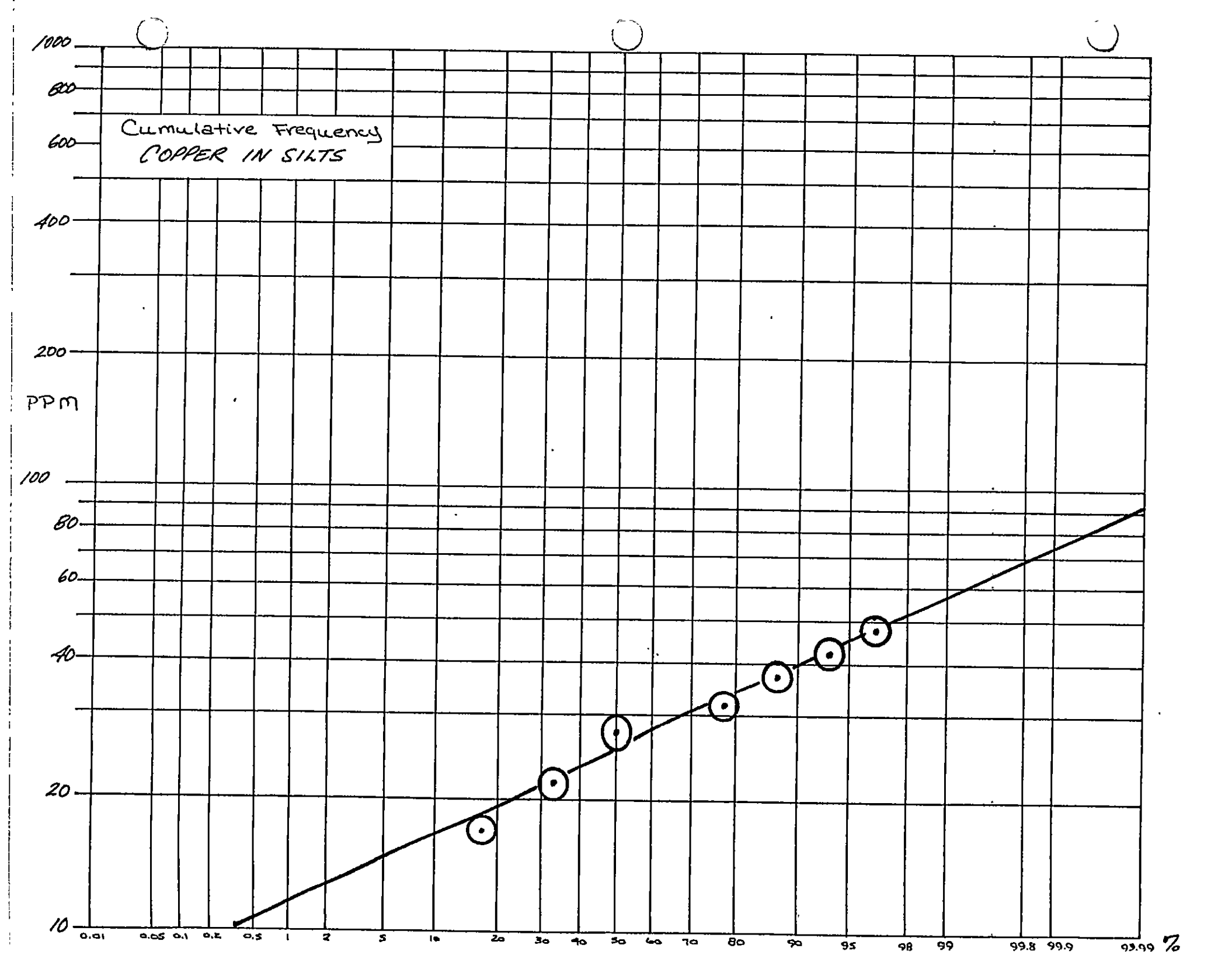
DISTRIBUTION OF VARIABLE: CW SILT NICKEL

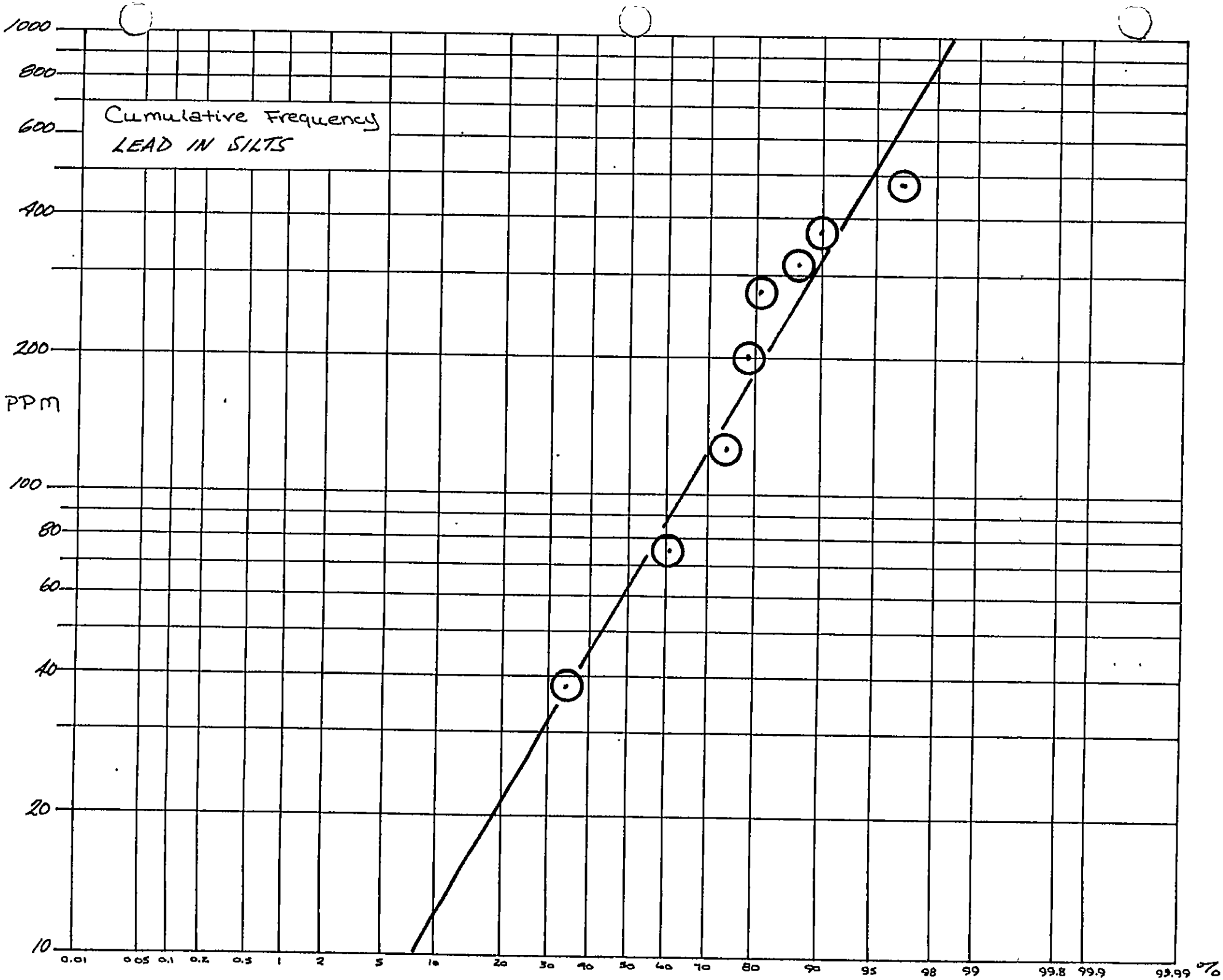
INTERVAL			FREQUENCY	PERCENT	CUMULATIVE %
12.000	TO	17.999	10	32.3	32.3
18.000	TO	23.999	8	25.8	58.1
24.000	TO	29.999	5	16.1	74.2
30.000	TO	35.999	3	9.7	83.9
36.000	TO	41.999	2	6.5	90.3
42.000	TO	47.999	0	0.0	90.3
48.000	TO	51.999	1	3.2	93.5
52.000	TO	63.999	0	0.0	93.5
64.000	TO	85.999	0	0.0	93.5
86.000	TO	108.000	2	6.5	100.0
T O T A L			31	100.0	

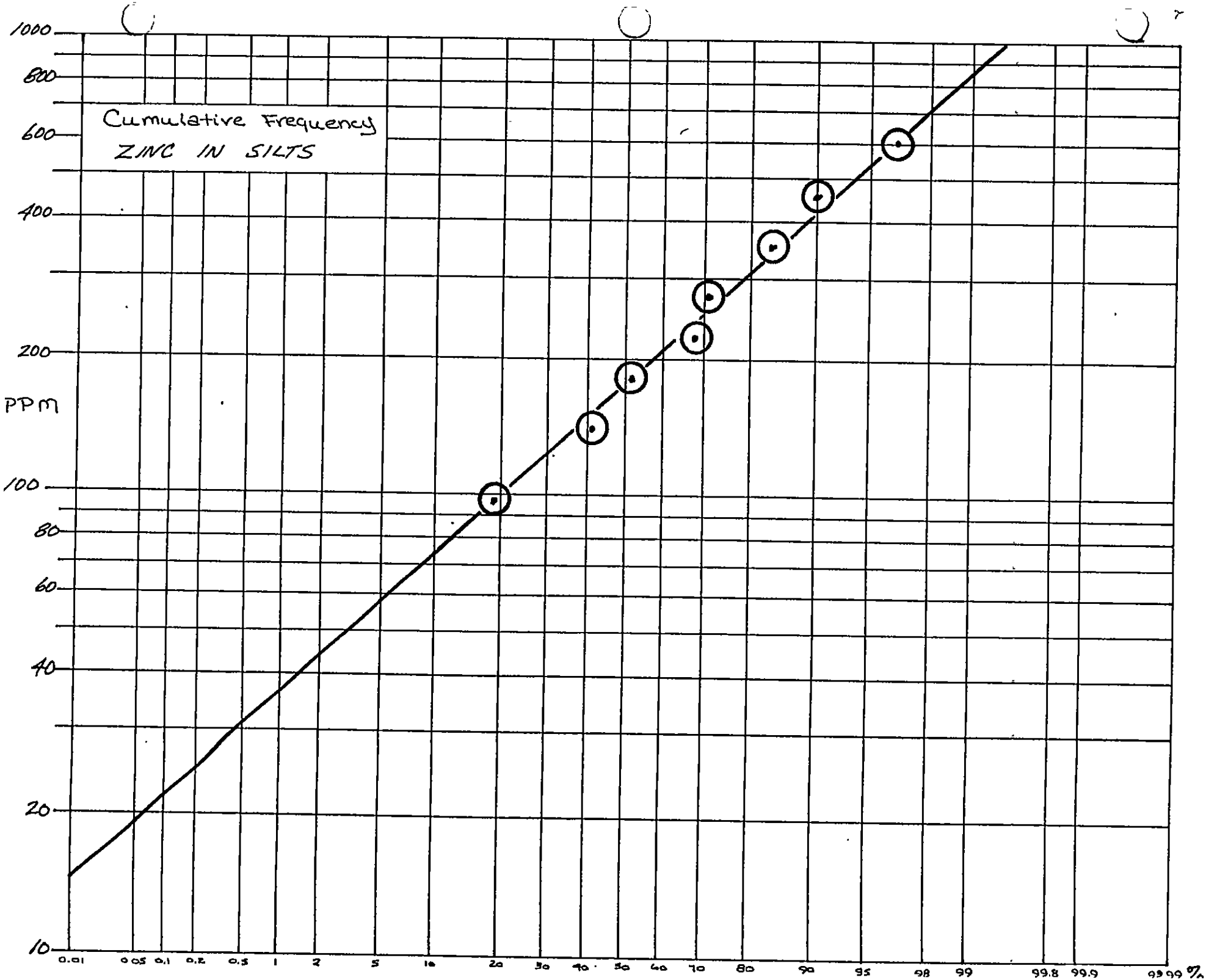
F R E Q U E N C Y D I S T R I B U T I O N

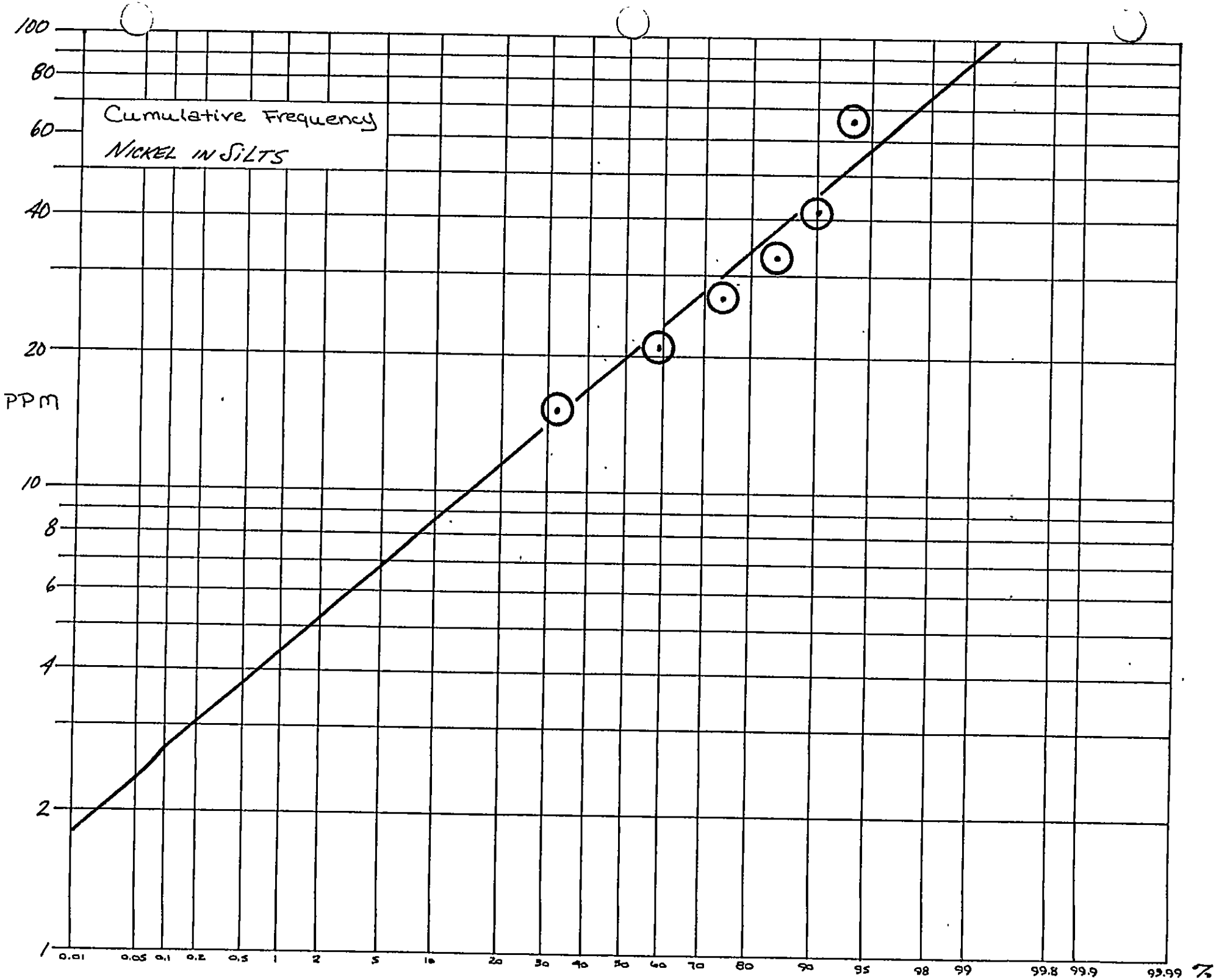
DISTRIBUTION OF VARIABLE: CW SILT COBALT

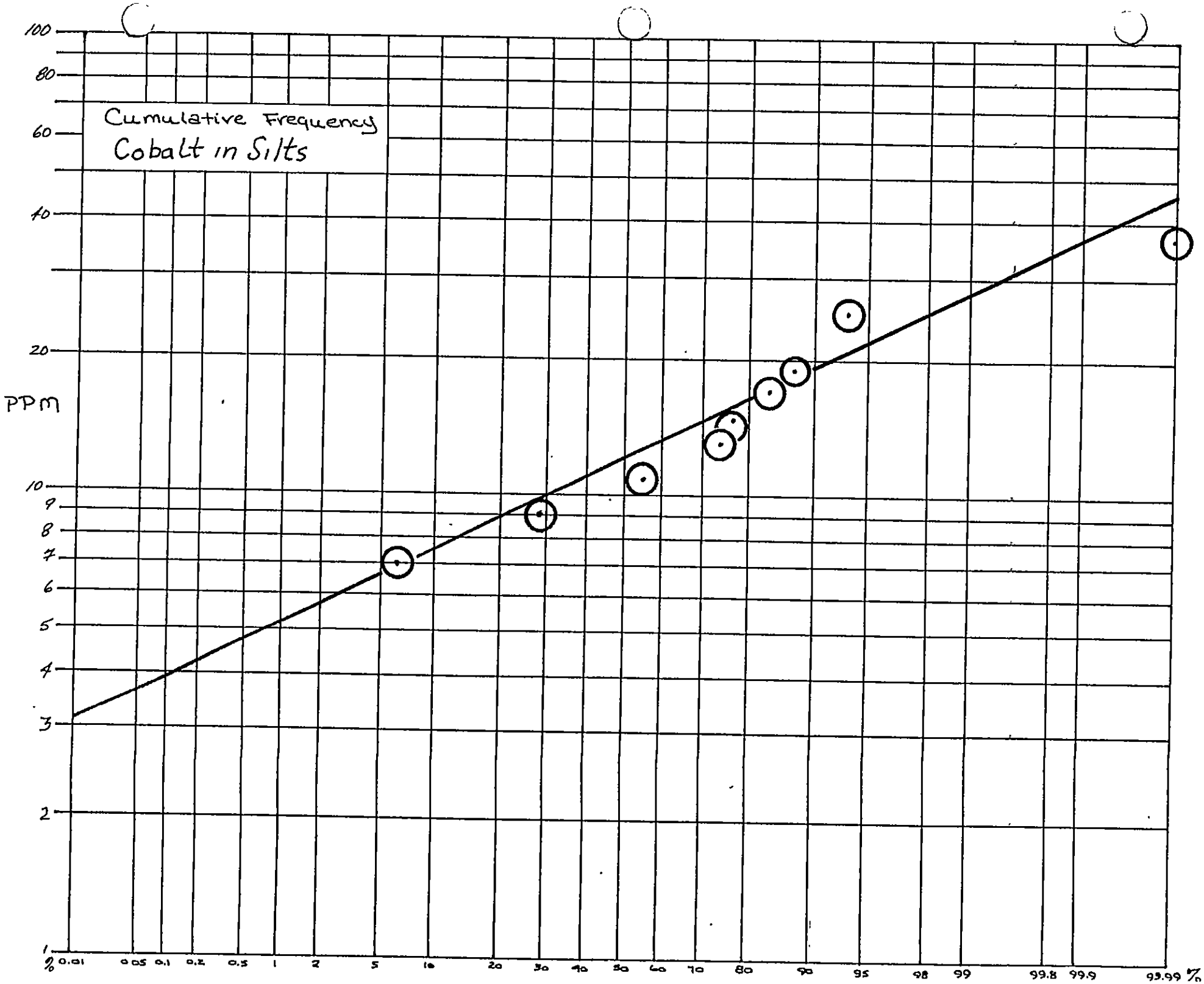
INTERVAL			FREQUENCY	PERCENT	CUMULATIVE %
6.000	TO	7.999	2	6.5	6.5
8.000	TO	9.999	7	22.6	29.0
10.000	TO	11.999	8	25.8	54.8
12.000	TO	13.999	6	19.4	74.2
14.000	TO	15.999	1	3.2	77.4
16.000	TO	17.999	2	6.5	83.9
18.000	TO	19.999	1	3.2	87.1
20.000	TO	21.999	2	6.5	93.5
22.000	TO	29.999	0	0.0	93.5
30.000	TO	42.000	2	6.5	100.0
T O T A L			31	100.0	


Cumulative Frequency
COPPER IN SILTS
1000
800
600
400
200
PPM
100
80
60
40
20
10
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
%


Cumulative Frequency
LEAD IN SILTS
1000
800
600
400
200
PPM
100
80
60
40
20
10
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
%


Cumulative Frequency
ZINC IN SILTS
1000
800
600
400
200
PPM
100
80
60
40
20
10
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
%


Cumulative Frequency
NICKEL IN SILTS
PPM
100
80
60
40
20
10
8
6
4
2
1
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
%


Cumulative Frequency
Cobalt in Silts
PPM
100
80
60
40
20
10
9
8
7
6
5
4
3
2
1
% 0.01 0.05 0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9 99.99 %

APPENDIX 9

1981 EXPENDITURES

STATEMENT OF 1981 EXPENDITURES
COMMONWEALTH PROPERTY

NAME/ADDRESS	DAYS ON PROPERTY	WAGES			SUBSISTENCE		
		Days Worked	Daily Rate	Total Wage	Total Days	Rate Per Day	Amount
John S. Hand Senior Geologist #55, 5625 Silverdale Dr. N.W. Calgary, Alberta T3B 4N5	July 21,23-31 Aug. 1-2,4-7,10-11,15,30 Sept. 14,19-20,22-23	25	$330.00/day	$8,250.00	26	$20.00	$520.00
Gordon W. Sinden Senior Technologist #55, 5625 Silverdale Dr. N.W. Calgary, Alberta T3B 4N5	July 21,23-31 Aug. 1-2,4-7,11	17	$232.50/day	$3,952.50	18	$20.00	$360.00
David S. Evans Exploration Manager 5232 Viceroy Dr. N.W. Calgary, Alberta T3A 0V7	July 24 Aug. 3 Sept. 19	3	$450.00/day	$1,350.00	3	$20.00	$60.00
Ian D. Kewley Field Assistant 4603 Namaka Crescent N.W. Calgary, Alberta T2K 2H5	July 21	1	$207.68/day	$207.68	1	$20.00	$20.00
Tim Joveski Field Assistant R.R. #1 Nelson, B.C. V1L 5P4	July 21,24,27-31 Aug. 1-2,4-8	14	$150.00/day	$2,100.00	15	$20.00	$300.00
Ken Konkin Field Assistant Box 52 Nelson, B.C. V1L 5P7	July 21,24,26-31 Aug. 1-2,4-8	15	$150.00/day	$2,250.00	16	$20.00	$320.00
			TOTAL	$18,110.18		TOTAL	$1,580.00

ROBERTSON RESEARCH

STATEMENT OF 1981 EXPENDITURES
COMMONWEALTH PROPERTY
(continued)

Other Expenditures

Camp Service Contract (3 month)	$4,406.00
Field Office Rental (@ $10.00/day/man)	460.00
Supplies and Equipment	667.20
Truck Rental (incl. gas, oil, maintenance)	1,747.26
4-wheel Drive Rental (mileage @ 20¢/km)	516.60
Helicopter	398.62
Airfares	206.88
Freight	73.76
Communications - Telephone	212.65
Communications - Radio	150.00
	8,838.97

Geochemical Analyses

77 silt samples analyzed for Mo @ $1.75/sample	134.75
245 silt samples - preparation @ $0.50/sample	122.50
245 silt samples - analyzed for Cu,Pb,Zn, Ni,Ag,Mo,Co @ $6.25/sample	1,531.25
55 rock samples - preparation @ $2.50/sample	137.50
47 rock samples - analyzed for Cu,Pb,Zn, Ni,Ag,Mo,Co @ $6.25/sample	293.75
8 rock samples - analyzed for Cu,Pb @ $2.50/sample	20.00
8 rock samples - analyzed for Zn,Ni,Co @ $2.25/sample	18.00
8 rock samples - analyzed for Mo @ $0.75/sample	6.00
8 rock samples - analyzed for Ag @ $0.75/sample	6.00
1 rock sample - analyzed for Si,Al,Ca, Mg,K,Na,Fe,Mg,Ti,Sr,Rb,Ba,Cr,V,P_2O_5, Ca,Co,Cu,Pb,Mo,Ni,Ag,Zn,LOI	30.50
	2,300.25

Geological Drafting

Oct. 5 - 4 hours @ $15.00/hr.	60.00
Oct. 14-15 - 9.25 hours @ $20.00/hr.	185.00
Nov. 4-6 - 4.5 hours @ $43.72/hr.	196.74
	441.74

STATEMENT OF 1981 EXPENDITURES
COMMONWEALTH PROPERTY
(continued)

Summary

Total Wages	$18,110.18
Total Subsistence	1,580.00
Other Expenditures	8,838.97
Geochemical Analyses	2,300.25
Geological Drafting	441.74
Total Project Costs	$31,271.14
Plus 10% Report Preparation	3,127.11
TOTAL 1981 EXPENDITURES	$34,398.25

APPENDIX 10

GEOPHYSICAL INSTRUMENT SPECIFICATIONS

APPENDIX 10

GEOPHYSICAL INSTRUMENT SPECIFICATIONS

GEONICS LIMITED
VLF EM 16

Source of Primary Field:	VLF transmitting stations
Transmitting Stations Used:	Any desired station frequency can be supplied with the instrument in the form of plug-in tuning units. Two tuning units can be plugged in at one time. A switch selects either station.
Operating Frequency Range:	About 15-25 Hz
Parameters Measured:	(1) The vertical in-phase component (tangent of the tilt angle of the polarization ellipsoid). (2) The vertical out-of-phase (quadrature) component (the short axis of the polarization ellipsoid compared to the long axis).
Method of Reading:	In-phase from a mechanical inclinometer and quadrature from a calibrated dial. Nulling by audio tone.
Scale Range:	In-phase ±150%; quadrature ±40%
Readability:	±1%
Reading Time:	10-40 seconds depending on signal strength
Operating Temperature Range:	-40 to 50° C.
Operating controls:	ON-OFF switch, battery testing push button, station selector, switch, volume control, quadrature, dial ±40%, inclinometer dial ±150%
Power Supply:	6 size AA (penlight) alkaline cells. Life about 200 hours
Dimensions:	42 x 14 x 9 cm (16 x 5.5 x 3.5 in)
Weight:	1.6 kg (3.5 lbs)
Instrument Supplied With:	Monotonic speaker, carrying case, manual of operation, 3 station selector plug-in tuning units (additional frequencies are optional), set of batteries
Shipping Weight:	4.5 kg (10 lbs.)
Name and Address of Manufacturer:	Geonics Limited 1745 Meyerside Drive/Unit 8 Mississauga, Ontario L5T 1C5

CRK.

CRAWFORD

HOOKER CRK.

HOUGHTON CRK.

GRAY CRK.

LA FRANCE CRK.

CANYON

SLOCAN M.D.

FORT STEELE M.D.

SILVER HILL
MAJOR RESOURCES

HIDDEN TREASURE

HOOKER

COMMONWEALTH GROUP
CELCAN MINERALS

FIVE METALS

COCHRANE OIL & GAS

SLOCAN M.D.

NELSON M.D.

BARIBEAU CRK

BAKER CRK.

BAKER CLAIMS – COMINCO

WALL GROUP
DEKALB MINING CORP.

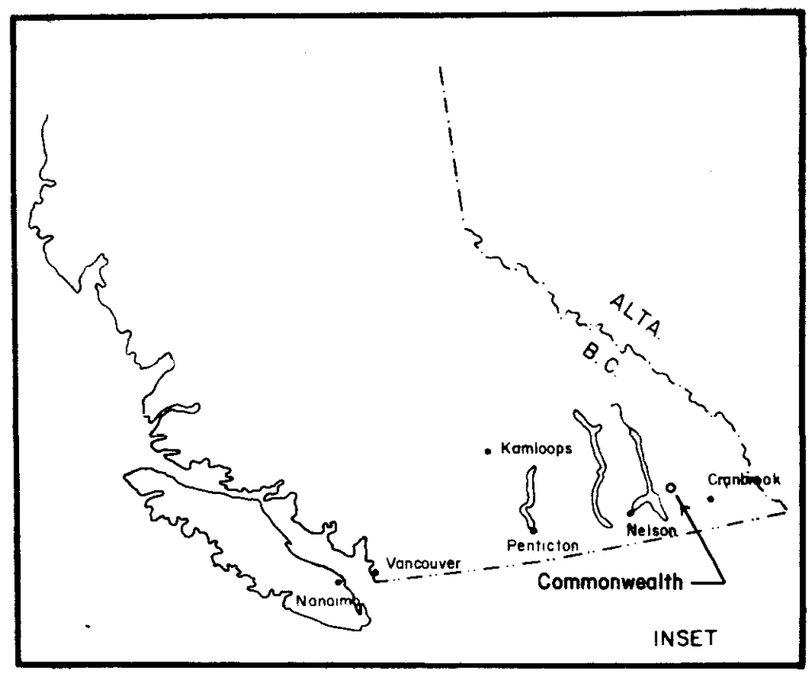
FORT STEELE M.D.

NELSON M.D.

REDDING CRK

DAVE GROUP
NORCEN

8 6 5 4



N

LEGEND (Modified after Rice 1941)

WINDERMERE

8 Horsethief Creek series

6 Toby conglomerate

PURCELL

5 Argillite, magnesian limestone, quartzite.

4 Argillite, magnesian limestone, quartzite.

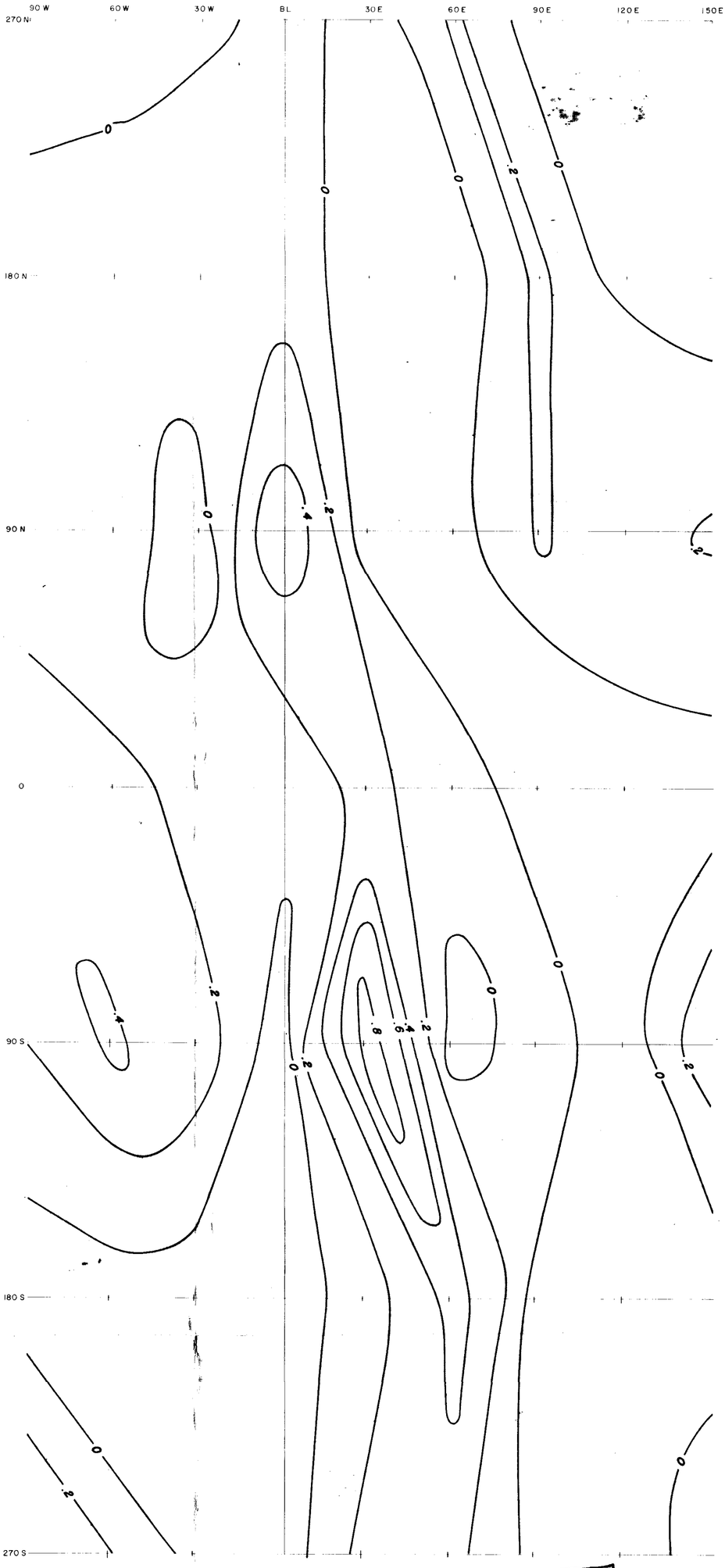
GREENWICH RESOURCES INC.

COMMONWEALTH SHOWING
LOCATION, GEOLOGY & MINERAL DISPOSITIONS

Fig. 1

Date: OCT. 1981	Scale: 1 : 50,000	Ref. No. 5[illegible]

Prepared by
Robertson Research Canada Limited



10 0 10 20 30 40 50

GREENWICH RESOURCES INC.

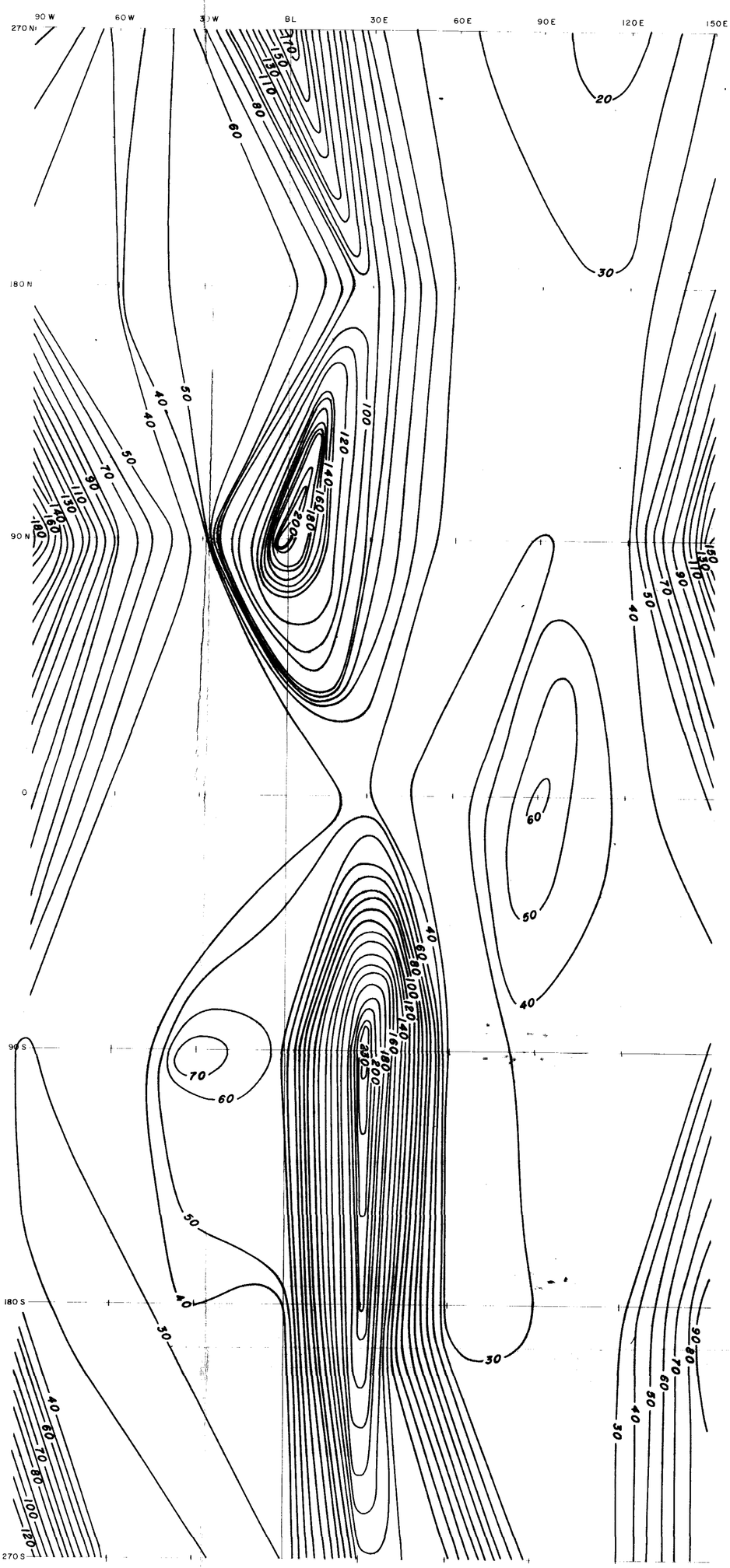
COMMONWEALTH SHOWING

SILVER IN SOILS

CONTOUR INTERVAL 10PPM Fig. 3e

DATE: OCT. 1981	SCALE: 1:1,000	REF. NO. 5011

Prepared By
Robertson Research Canada Limited



MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
10963

PROFESSIONAL GEOLOGIST
KEVIN S. HANDYSIDE
ALBERTA

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS AND GEOPHYSICISTS OF ALBERTA
PERMIT NUMBER P 141
Robertson Research Canada Limited

10 0 10 20 30 40 50

GREENWICH RESOURCES INC.

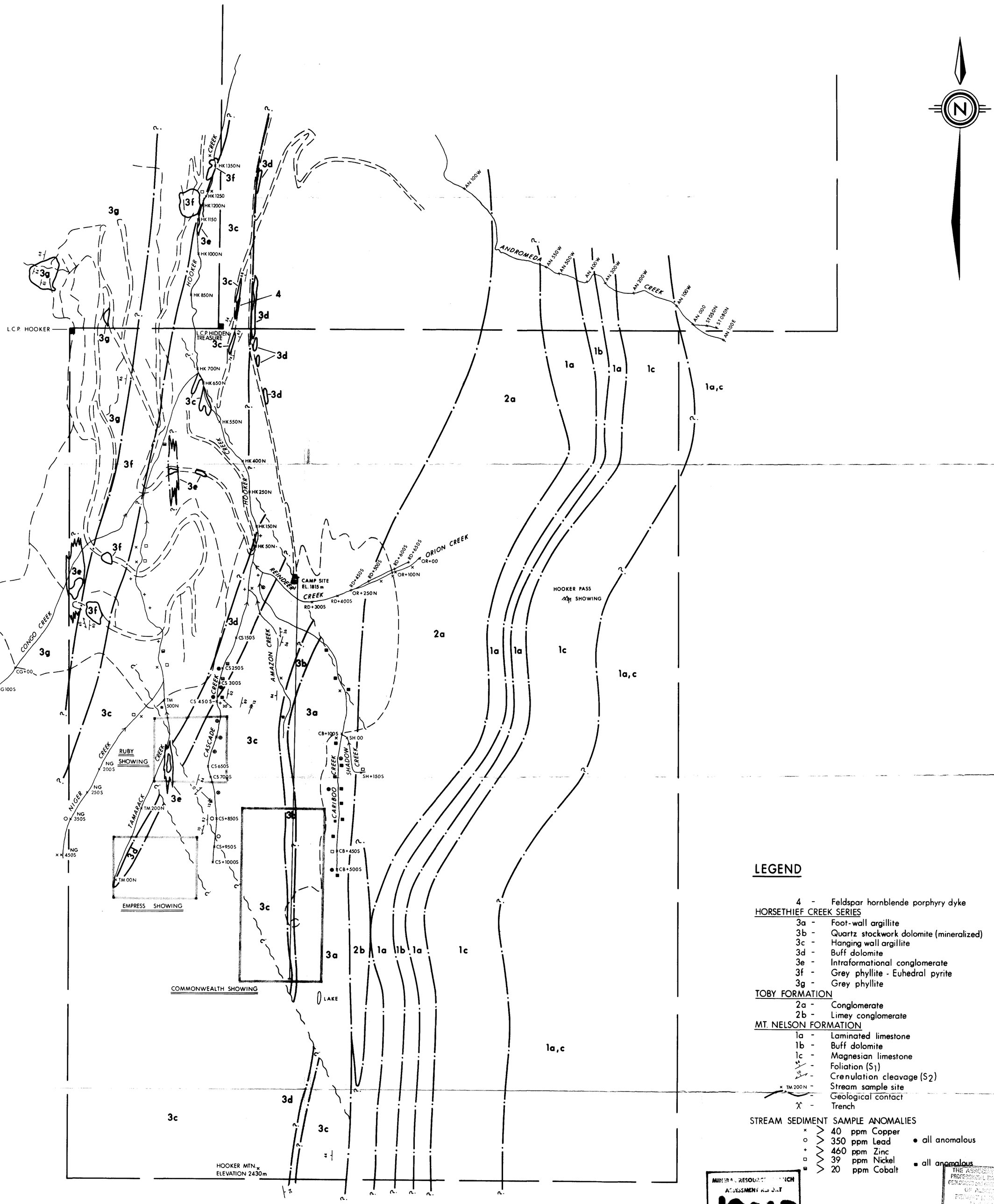
COMMONWEALTH SHOWING

ZINC IN SOILS

CONTOUR INTERVAL 10PPM Fig. 3d

DATE: OCT. 1981	SCALE: 1:1,000	REF. NO. 5011

Prepared By
Robertson Research Canada Limited



LEGEND

4 - Feldspar hornblende porphyry dyke

HORSETHIEF CREEK SERIES

- 3a - Foot-wall argillite
- 3b - Quartz stockwork dolomite (mineralized)
- 3c - Hanging wall argillite
- 3d - Buff dolomite
- 3e - Intraformational conglomerate
- 3f - Grey phyllite - Euhedral pyrite
- 3g - Grey phyllite

TOBY FORMATION

- 2a - Conglomerate
- 2b - Limey conglomerate

MT. NELSON FORMATION

- 1a - Laminated limestone
- 1b - Buff dolomite
- 1c - Magnesian limestone
- Foliation (S_1)
- Crenulation cleavage (S_2)
- TM 200N - Stream sample site
- Geological contact
- Trench

STREAM SEDIMENT SAMPLE ANOMALIES

- × > 40 ppm Copper
- ○ > 350 ppm Lead
- \+ > 460 ppm Zinc
- □ > 39 ppm Nickel
- ■ > 20 ppm Cobalt

• all anomalous

• all anomalous

1: 5000

100 50 0 100 200 300

Prepared By
Robertson Research Canada Limited

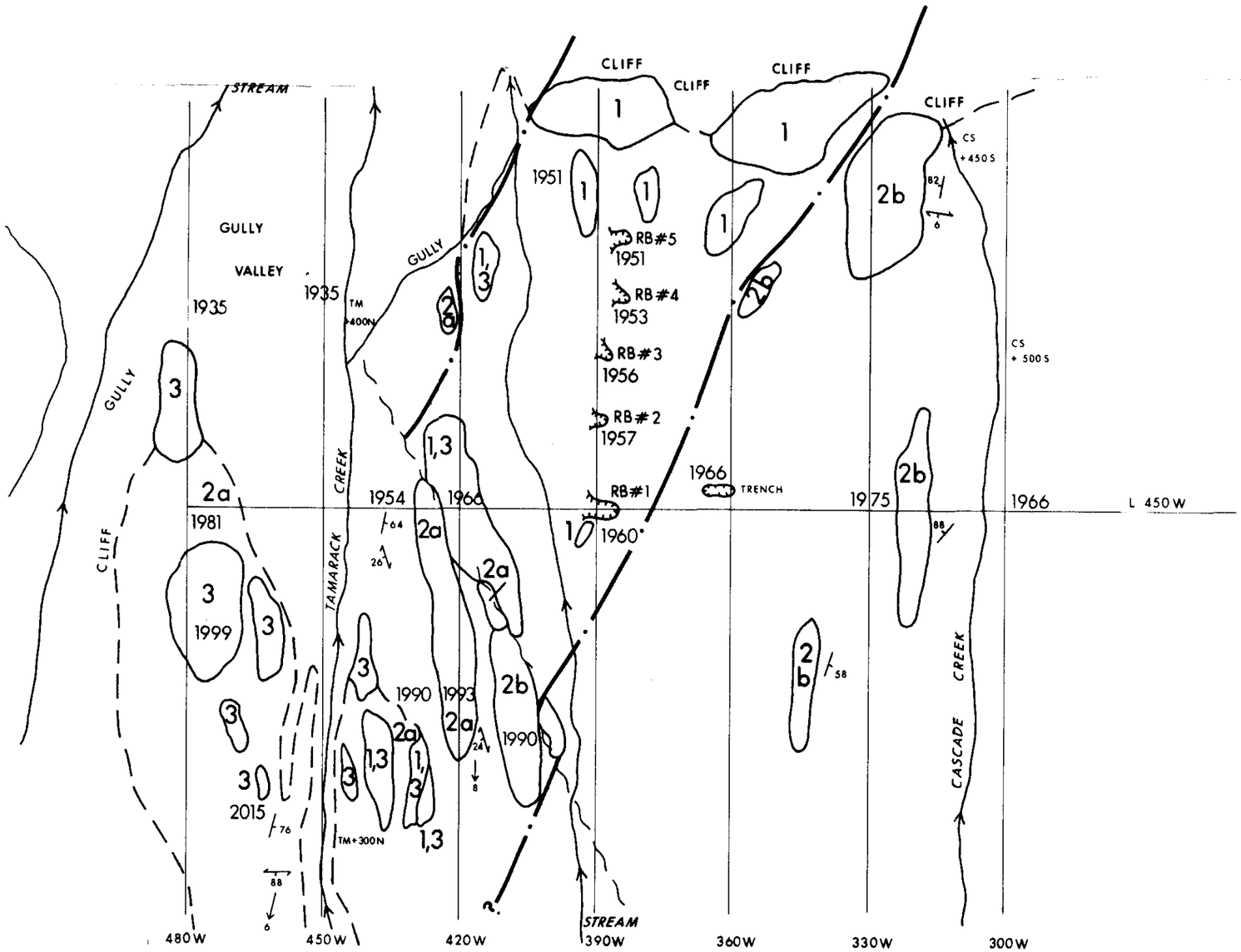
GREENWICH RESOURCES INC.

COMMONWEALTH PROPERTY

GEOLOGY

FIG. 2

COMPILED BY: J. HAND	DATE: OCT, 1981
DRAWN BY: J. COONEY	PROJ. No: 5011



LEGEND

- Contact
- 1953 — Elevation in meters
- RB # — Ruby showing trench
- 3 — Conglomerate
- 2a — Crenulated grey schistose argillite
- 2b — Black laminated schistose argillite
- 1 — Quartz intruded dolomite
- Foliation (S1)
- Crenulation cleavage (S_2)

10 0 10 20 30 40 50

SCALE : 1:1000

Prepared By
Robertson Research Canada Limited

GREENWICH RESOURCES INC.

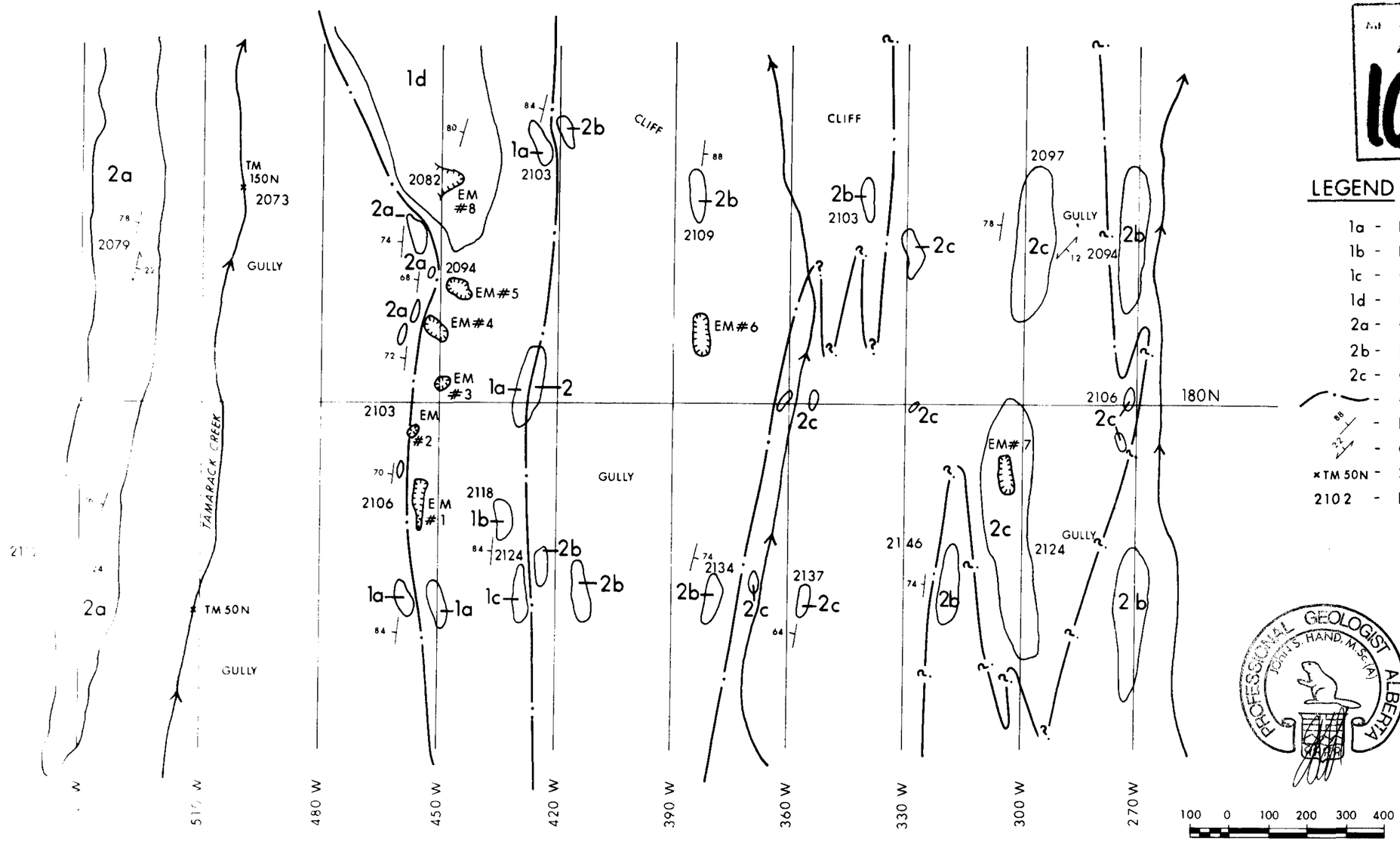
COMMONWEALTH PROPERTY

RUBY SHOWING

DETAILED GEOLOGY

Fig. 4

COMPILED BY: K. KONKIN	DATE: OCT/81
DRAWN BY: J. COONEY	PROJ. No: 5011



LEGEND

- 1a - Dolomite
- 1b - Bedded dolomite
- 1c - Quartz intruded dolomite
- 1d - Quartz intruded banded dolomite
- 2a - Grey schistose argillite
- 2b - Black laminated schistose argillite
- 2c - Crenulated schistose argillite
- Geological contact
- Foliation (S1)
- Crenulation cleavage (S2)
- ×TM 50N - Stream sample site
- 2102 - Elevation (meters)

100 0 100 200 300 400
SCALE = 1:1000

Prepared By
Robertson Research Canada Limited

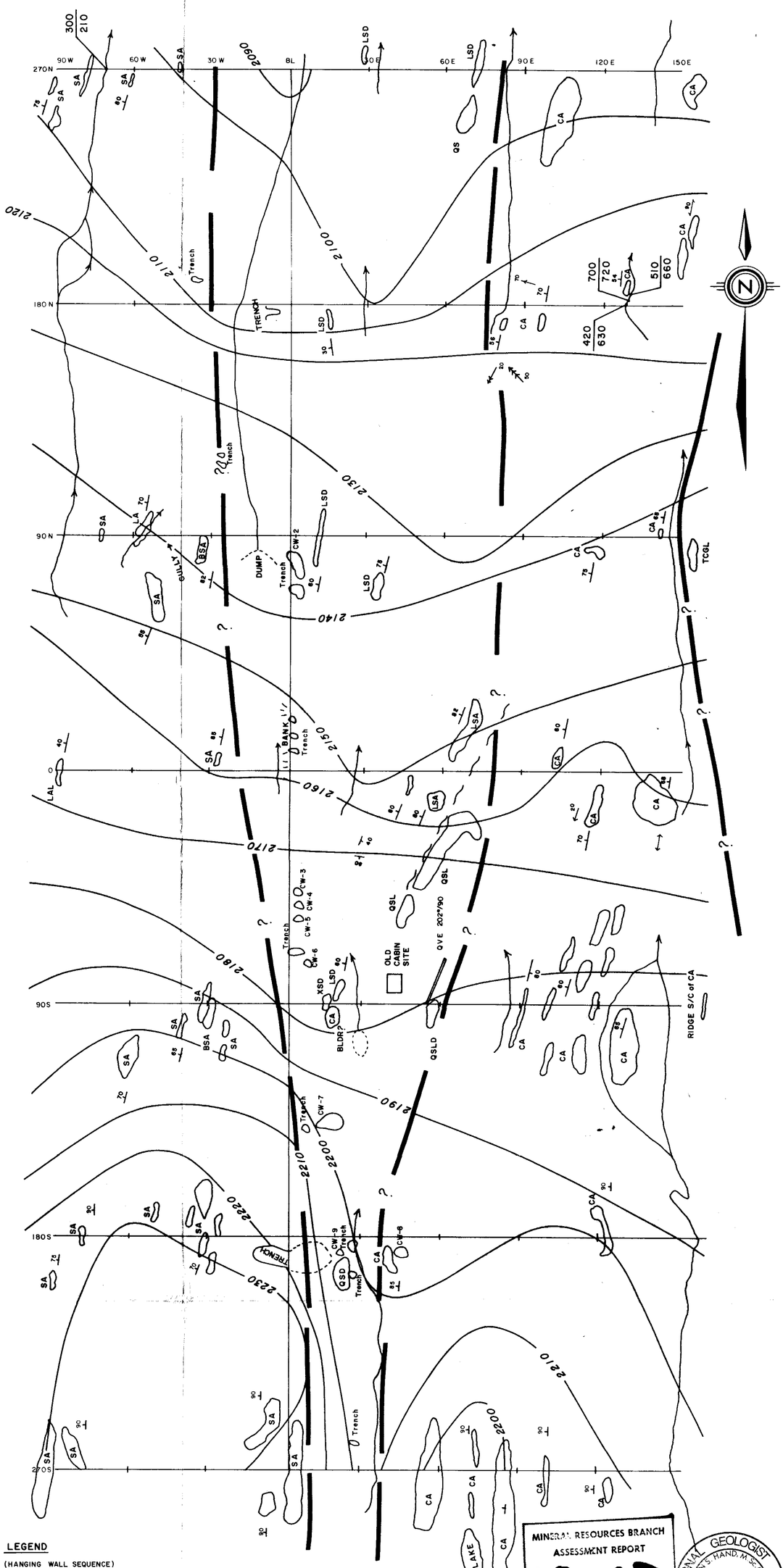
GREENWICH RESOURCES INC.

EMPRESS SHOWING

DETAILED GEOLOGY

FIG. 5

COMPILED BY T. JOVESKI	DATE OCT. 1981
DRAWN BY J. COONEY	PROJ. No. 5011



LEGEND

(HANGING WALL SEQUENCE)

- SA SCHISTOSE ARGILLITE
- LA LAMINATED ARGILLITE
- BSA BIOTITE SCHIST

(MINERALIZED ZONE)

- QSD DOLOMITE CONTAINING MINERALIZED QUARTZ STOCKWORK

(FOOT WALL SEQUENCE)

- LSD LAMINATED SUCROSIC DOLOMITE
- XSD VUGGY SUCROSIC DOLOMITE
- QSL LIMESTONE CONTAINING SPARSELY MINERALIZED QUARTZ STOCKWORK
- LSA LIMEY SCHISTOSE ARGILLITE
- TCGL TOBY FORMATION CONGLOMERATE
- CA CRENULATED ARGILLITE

STRIKE FOLIATION DIP
LINEATION (L_1)
LINEATION (L_2)
LINEATION (L_3)
FAULT
INFERRED LITHOLOGICAL CONTACT
STREAM SEDIMENT SAMPLE SITE
CW9 GRAB SAMPLE SITE

GREENWICH RESOURCES INC.

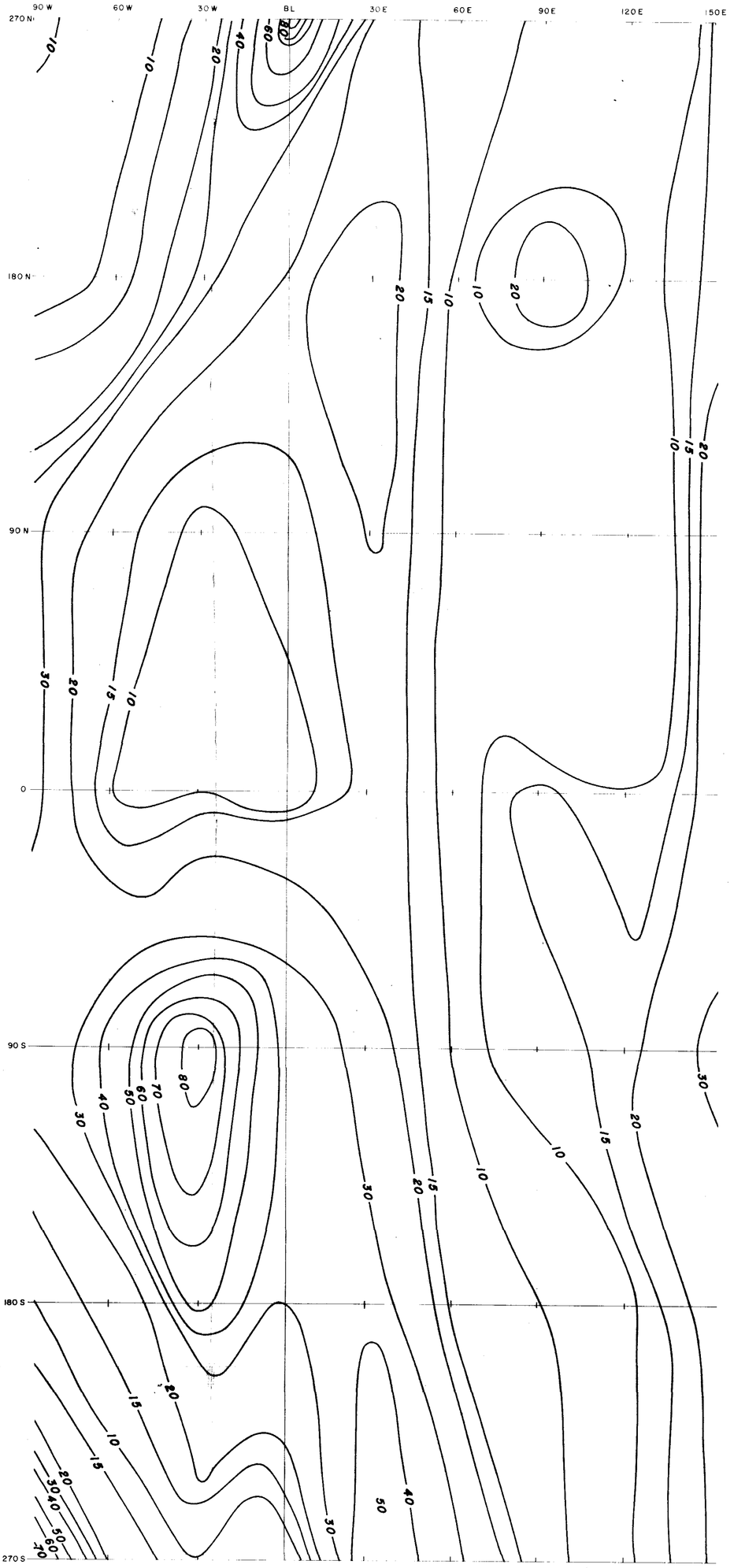
COMMONWEALTH SHOWING

DETAILED GEOLOGY

Fig. 3a

Date	Scale	Ref No
OCT. 1981	1:1000	5011

Prepared by
Robertson Research Canada Limited



10 0 10 20 30 40 50

GREENWICH RESOURCES INC.

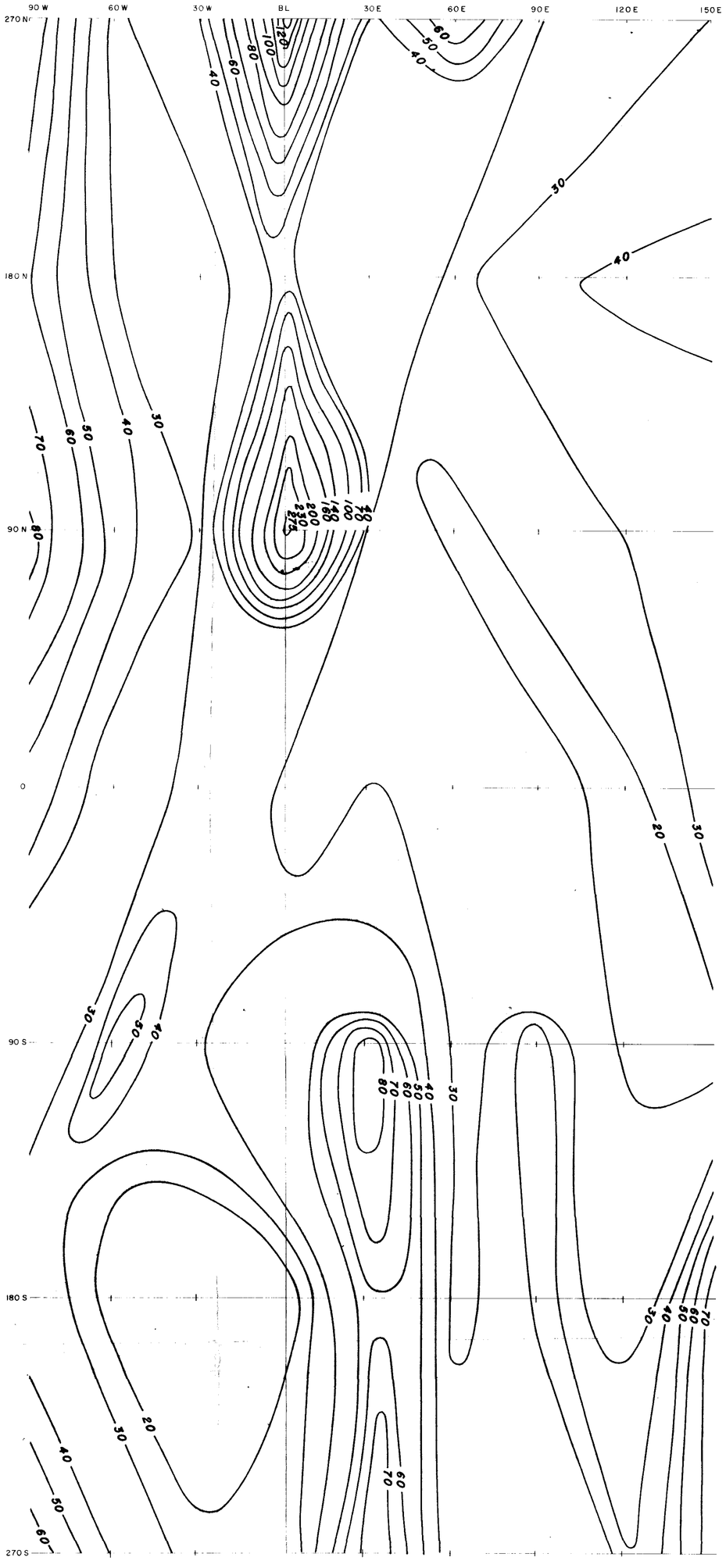
COMMONWEALTH SHOWING

COPPER IN SOILS

CONTOUR INTERVAL 10PPM Fig. 3b

DATE: OCT. 1981	SCALE: 1:1,000	REF. NO. 5011

Prepared By
Robertson Research Canada Limited



10 0 10 20 30 40 50

GREENWICH RESOURCES INC.

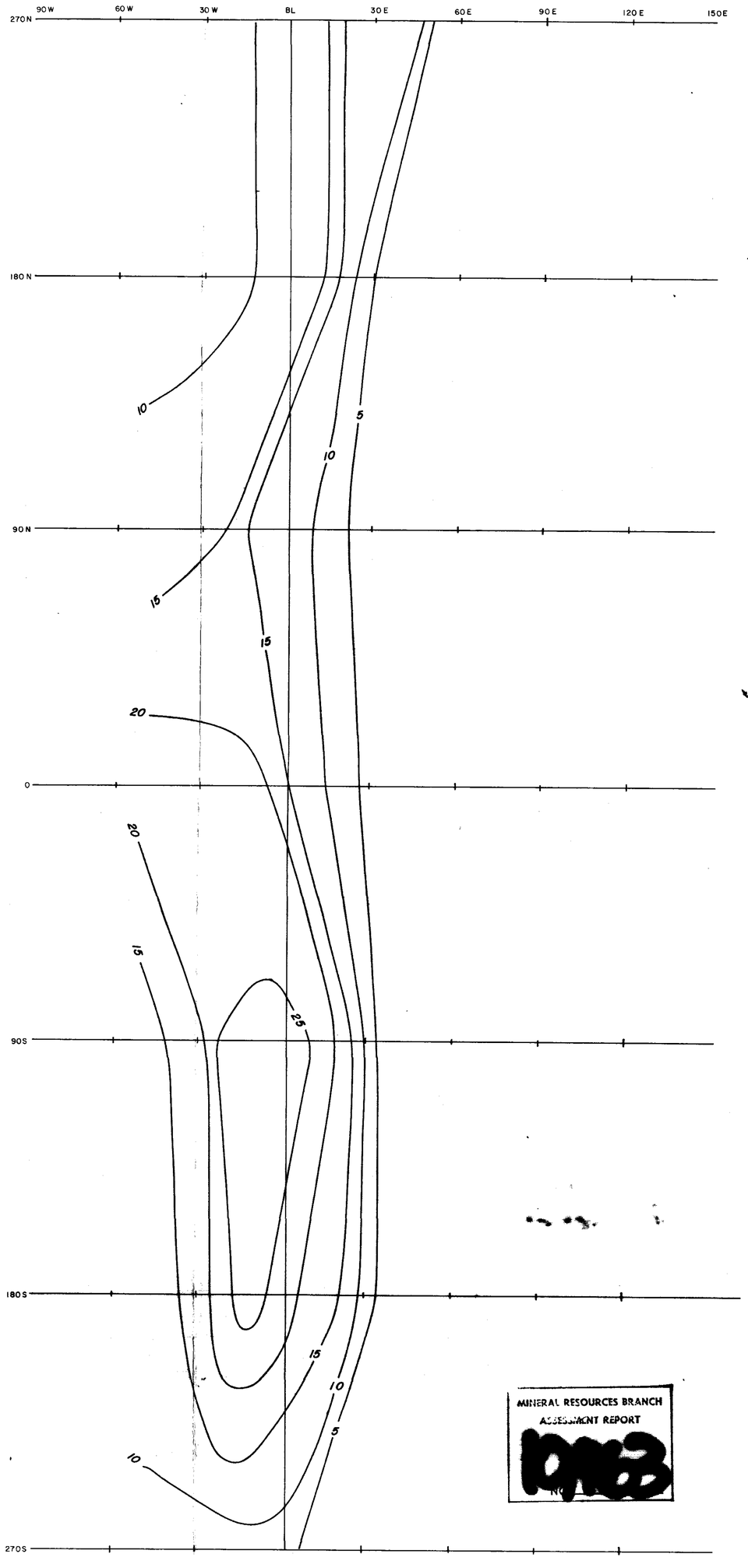
COMMONWEALTH SHOWING

LEAD IN SOILS

CONTOUR INTERVAL 10PPM Fig.3c

DATE : OCT. 1981	SCALE : 1:1,000	REF. NO. 5011

Prepared By
Robertson Research Canada Limited



10 0 10 20 30 40 50

GREENWICH RESOURCES INC.

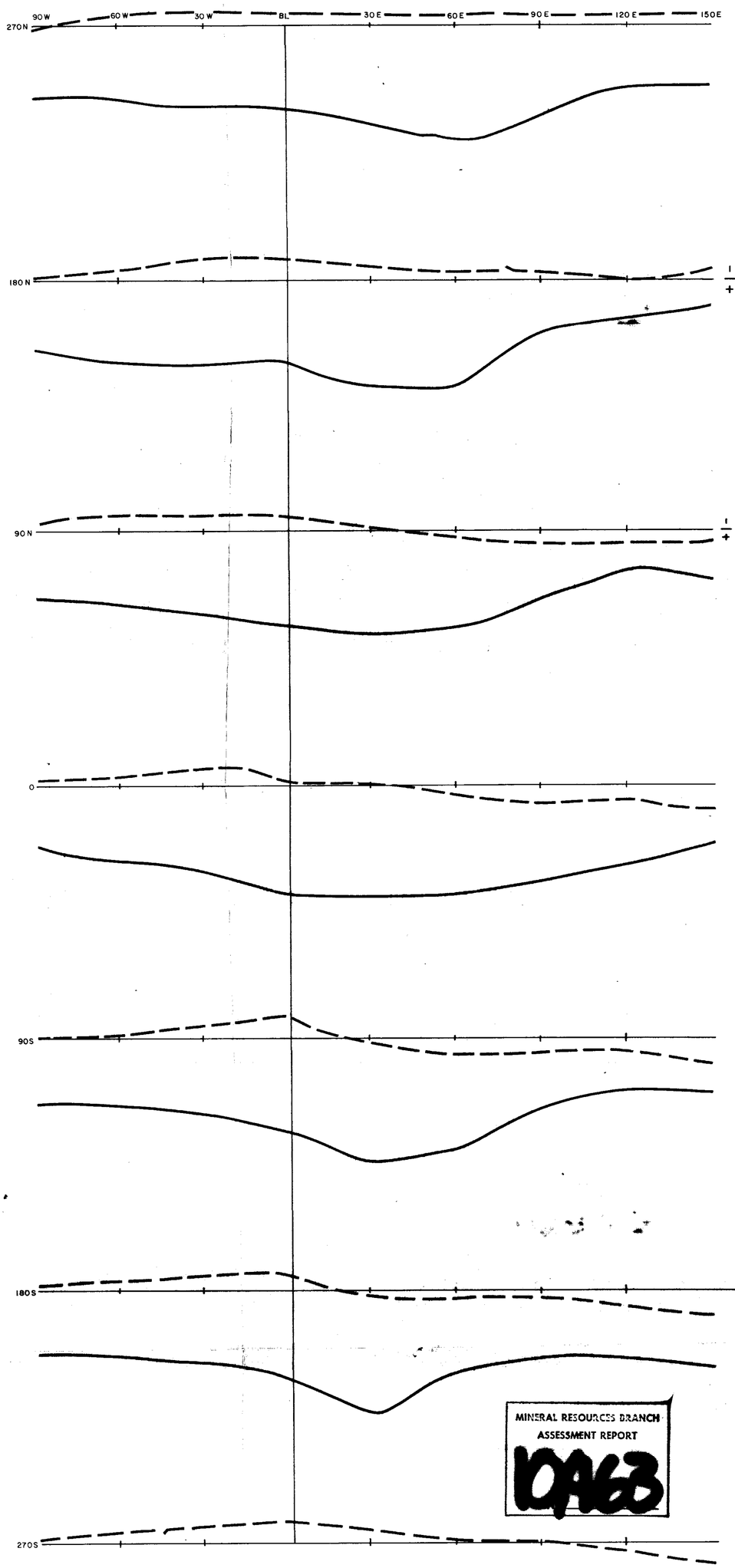
COMMONWEALTH SHOWING

VLF-EM SURVEY
(FRASER FILTERED)

Fig. 3g

Date: OCT. 1981	Scale: 1:1000	Ref. No. 5011

Prepared by
Robertson Research Canada Limited



LEGEND

SEATTLE IN PHASE

SEATTLE QUADRATURE

10 0 10 20 30 40 50

GREENWICH RESOURCES INC.

COMMONWEALTH SHOWING

VLF SURVEY

Fig. 3f

Date: OCT. 1981 | Scale: 1cm = 10m, 1cm = 10% | Ref. No. 5011

Prepared by
Robertson Research Canada Limited