932/2E

932-2-07 PROPERTY FILE

015406

NADINA

NADINA EXPLORATIONS LIMITED (N.P.L.)

- 789 WEST PENDER STREET, VANCOUVER 1, B.C., TELEPHONE 683-6964

19th August 1968.

DIRECTORS' REPORT TO SHAREHOLDERS

As a follow-up to our letter to shareholders of 1st June 1968, we wish to report the completion of our soil sampling program and we are now in the second phase of our program which consists of bulldozer stripping of the anomalies outlined.

Because of heavy overburden, progress has been slow, but one vein of importance has been stripped and sampled over an approximate distance of 245 feet with an approximate average width of three feet giving the following assays:-

	Gold oz./ton	Silver oz./ton	% Copper	% Zinc	% Lead
	.022	11.70	.89	7.60	.24
	.055	21.80	2.60	6.60	.10
	.036	8.20	.52	9.20	.30
	.047	38.00	7.80	2.80	.95
	.022	6.70	.84	6.20	.16
	.054	17.80	6.80	2.80	.16
	.010	47.00	8.40	1.80	.30
	.041	31.00	6.70	.30	.16
	.067	15.00	4.30	.60	.30
	.073	35.00	9.60	.50	.45
	.230	47.00	6.40	.42	.49
	.250	49.00	9.30	.18	.52
	.073	22.60	8.10	.58	.26
	.006	3.90	1.70	.40	.16
	.180	44.00	9.40	.24	.48
	.009	1.95			
	.017	32.50			
Average	.070 oz.	26.58 oz.	5.55%	2.68%	.33%

This vein is open at both ends and stripping is continuing.

Recent bulk check-sampling on another vein over a length of approximately 950 feet and four feet wide gave the following average assay:-
Gold .16 oz., Silver 9.22 oz., Copper .22%, Lead 2.98%, Zinc 5.43%.

Diamond drilling and a program of underground work will follow the completion of the stripping program, meanwhile your directors are negotiating for future financing.

On Behalf of the Board,

W. F. McGowan, President.

Suite 910 - 800 West Pender Street
Vancouver, B.C., Canada V6C 2V6
Telephone: (604) 683-4245

Houston Metals Corporation

November 6, 1986

FOR IMMEDIATE RELEASE

WORK TO COMMENCE ON SILVER QUEEN POLYMETALLIC ORE BODY - FINANCINGS PROVIDE $1.45 MILLION (Cdn).

Houston Metals Corporation ("Houston") is pleased to announce that work has commenced on an extensive exploration and development program for its Silver Queen polymetallic ore body. The Silver Queen property intersects an all weather highway 30 miles southwest of Houston, B.C. The orebody has strategic metal; gallium, germanium, indium and cadmium; precious metal; gold and silver; and base metal; zinc, lead and copper; values. The report dated June 24th, 1986 by W.W. Cummings, P. Eng. states the property has proven reserves to date of 557,590 tons in the #3 vein and 110,000 tons in the tailings pond. Grades range from .1-.4 oz/ton Gold, 7 oz.-30 oz. per ton Silver, 20 grams-188 grams per tonne gallium, 20 grams-128 grams per tonne germanium, .5 oz/ton-.75 oz./ton indium, with base metal medium grades 7.0% zinc, 2.5% lead, 0.5% copper. No proven tonnage on other veins or zones is calculated.

Mr. Cummings recommends a 3 stage program, the first stage to cost $992,885 (Cdn) to be completed in 4 months with the following program objectives:

"1. to bring as much ore into the proven or probably category as possible.

2. to emphasize the precious metal potential of the ore bodies.

3. To advance the metallurgical studies for the recovery of precious metals, gallium and germanium."

The program should increase the proven tonnage to ±1.4 million tons. Management infers up to 5 milion tons potential for the property, indicated by deep drilling results to date.

Financing for the first stage of the project is being provided by $1,000,000 (Cdn) from First Exploration Fund 1986 ("First Fund") by way of "flow through shares". Houston will issue to First Fund approximately 1.1 million shares at .90 cents per share and purchase 3,200 Class A preference shares of PutCo Holdings Ltd. ("PutCo") for $320,000 (Cdn). To finance the PutCo share purchase, Houston received $450,000 (Cdn) from an underwriting of 600,000 shares at .75¢ (Cdn). The Underwriters have an option on 300,000 shares at .85¢ (Cdn), which if exercised, would provide Houston with an additional $255,000 (Cdn).

By expending $300,000 (Cdn) by December 31st, 1986, Houston will earn a minimum 50% interest in the Silver Queen property (other interest holders include Placer Development Ltd.).

In addition to the base and precious metal values the Silver Queen ore body appears to be unique in its high concentration of gallium and germanium. Preliminary tests indicate that gallium, germanium, gold and silver occur in the sulphides and will report to the base metal concentrate making pressure leaching of these metals feasible at the mine site or alternatively to be shipped as part of a concentrate to a smelter.

Gallium is used in the production of gallium arsenide chips which will replace silicon chips in the next generation of super computers particularly where speed (10 times faster) jamming and radiation protection is required. Gallium arsenide is also used together with alloys of germanium and indium in multi-junction photovoltaic cells to produce electricity directly from sunlight.

Germanium's primary use is in fibre optics and the manufacture of infra red lenses and is classified as a strategic metal to be stockpiled by the U.S. Government. Future demands for these strategic metals is expected to increase dramatically.

Recent articles in Time, October 6th, 1986, "And Now, the Age of Light" and Fortune, October 13th, 1986, "The High-Tech Race" detail the technological revolution now taking place spurred by increasingly sophisticated and efficient computers and super chips utilizing gallium arsenide; the burgeoning optoelectronics field yielding products such as optical fiber communication systems, where gallium and germanium are needed as raw materials.

The Information Age is here and strategic metals such as gallium, germanium and indium are needed.

HOUSTON METALS CORPORATION

Per:

J. MICHAEL MACKEY, Director

Suite 910 - 800 West Pender Street
Vancouver, B.C., Canada V6C 2V6
Telephone: (604) 683-4245

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The Information Age is here and strategic metals such as gallium, germanium and indium are needed.

HOUSTON METALS CORPORATION

Per:

J. MICHAEL MACKEY, Director

Please Return to EVJ

Silver Queen (Nadina) 93L/2E

93L-2

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SECTION 4

DISCUSSION

4.1 Preamble

The project originally was designed to confirm the down dip extension of the No. 3 Vein structure at a vertical depth of 150' below the lowest (2600 level) mine development in three areas, namely:

(a) between Sections 24700E - 25050E (North or No. 1 Cross-cut)

(b) between Sections 26750E - 27100E (Middle or No. 2 Cross-cut)

(c) between Sections 28100E - 28500E (South or No. 3 Cross-cut)

A cross-cut was designed for each area, from the end of which a fanned pattern of three down-dipping diamond drill holes were to be drilled, i.e. three holes per cross-cut for a total of nine holes. Each three hole fan was to cover a strike length of approximately 350 feet.

The above program was based on the recommendations of a report by the consulting firm of W. M. Sharp, P.Eng., North Vancouver, B.C.

While in the process of driving the No. 1 and 2 cross-cut the original program was changed with the purpose of intersecting the No. 3 Vein at a vertical depth of three hundred feet. This involved changing the diamond drill layout, where practicable, to reach the new target elevation.

Due to the assumed flat dip of the vein in the area of the No. 3 cross-cut, it was considered to be cheaper to drill the target zone from the surface rather than extend the length of the proposed cross-cut.

4.2 Drilling Results -- General Comments

The No. 3 Vein at Bradina is typical of vein-filled fault structures. In such structures the vein material tends to pinch and swell in thickness along strike and down dip. An increased vein thickness may be consistent for a short distance (a few feet) along strike and dip, or, in some instances for several hundreds of feet. This variation in vein thickness is usually associated with a change in strike direction and/or dip of the fault structure.

In addition the nature of the fault may change according to the rock type in which it occurs. In some rock types, the stress producing the fault may express itself as a single clean fracture; in others the same stress may result in a horse-tail type of shear zone or a brecciated stock-work, etc.

The above notes are relevant to the following discussion.

4.3 Underground Drilling

1. Drilling from No. 1 (North) Cross-cut *

Three diamond drill holes were drilled in this area all of which intersected the No. 3 Vein.

The shallowest intersection (D.D.H. UG74-2) was at a depth of 155' below 2600' or adit level and gave values of 0.052 Au, 6.31 Ag, 1.00 Cu, 0.64 Pb, 9.70 Zn, over an estimated true width of 5.7'.

Two other drill holes, UG 74-1 and UG 74-3 intersected the vein at a vertical depth of 255' and 285' respectively. These two holes in conjunction with the previously drilled Northgate diamond drill hole NGV-4 intersected the vein at an average depth of 280' below 2600 level and cover a strike length of approximately 300 feet.

These three lowest intersections show a remarkable consistency in estimated true width and are quite similar in assay values; they have been used to calculate

* all assay values in this report are expressed in ounces/ton for gold and silver and as per cent by weight for copper, lead and zinc.

"Drill Indicated Reserves" for Block C.

The estimated true width and assay values are as follows:

	Width In Feet	Au Oz/T	Ag Oz/T	Cu %	Pb %	Zn %
UG74-1	1.8'	0.010	4.18	1.10	0.33	5.40
UG74-3	1.7'	0.070	5.30	1.07	0.23	2.56
NGV-4	1.6'	Tr.	6.90	0.83	1.28	3.20

The results suggest an appreciable decrease in zinc content and a slight increase in copper; although there is inadequate information to determine whether or not this is a consistent trend.

Cross-sectional interpretation of D.D. Holes UG74-2 and 3 indicates a flattening of the vein dip from 70°to 55° below the -150 elevation. Extrapolating this information to the area of D.D.H. UG74-1 suggests a dip change from 70° to 45° - 50° below the -150 elevation.

It is suggested that the apparent pronounced narrowing of the vein (average estimated true width = 1.7') below the -150' horizon is directly related to the change in dip from approximately 70° (2600 level to -150+) to approximately 50° in the horizon of the lower three drill intersections.

2. Drilling from No. 2 Cross-cut

Three diamond drill holes were drilled from this cross-cut. The centre hole (UG74-5) intersected the No. 3 vein at a vertical distance of 290' below the 2600 level and the two wing holes (UG74-4 & 6) at a vertical distance of approximately 150'.

The estimated true widths and assay values are as follows:

	Width In Feet	Au Oz/T	Ag Oz/T	Cu %	Pb %	Zn %
UG74-4	8.0'	0.084	9.28	0.57	0.90	8.75
UG74-5	7.5'	0.172	6.07	0.06	2.30	12.97
UG74-6	6.5'	0.048	6.32	0.11	1.35	15.63

Strike length covered by the three intersections is approximately 400'. The dip of the vein in the area drilled averages 58° - 60° which is consistent with the stoped area above the level.

These three holes have been used to calculate Drill Indicated Reserves in this area.

With increased depth there is an apparent decrease in copper and an increase in silver and zinc, particularly the latter.

Drill indicated widths average 7.3' (estimated true width) and are consistent with vein exposures in the drift.

4.4 Surface Drilling

Three holes were drilled from surface namely, S74-1, S74-2 and S74-3 covering a strike length of approximately 500'.

Diamond drill holes S74-1 and S74-2 were drilled on the same bearing and were collared at declinations of $77\frac{1}{4}^{\circ}$ and $62\frac{1}{2}^{\circ}$ respectively.

S74-2 intersected what is interpreted to be the zone of the No. 3 vein at a vertical depth of approximately 500' below 2600 level. Mineralization was confined to narrow (less than 1') vein and alteration zones scattered over a length of approximately 27 feet. It appears that the No. 3 Vein in this area has feathered out into a series of narrow veinlets rather than following one single distinct structure. Assays are all of sub-ore grade.

Drill hole S74-1 encountered numerous minor (1-2") veinlets with sulphide mineralization none of which could be interpreted as the No. 3 Vein structure.

It is possible that the No. 3 Vein was not intersected due to:

a) steepening of the vein structure, or

b) the vein structure has been faulted in the area where it would normally be expected.

Drill hole S74-3 intersected the No. 3 Vein at a vertical depth of 315' below 2600 level approximately 500' south of Diamond Drill holes S74-1 and 2. Assay results were 0.320 Au, 9.68 Ag, 0.54 Cu, 0.18 Pb, 7.54 Zn over an estimated true width of 4.5'. This intersection in conjunction with the intersection in Diamond Drill Hole NGV 1 has been used to calculate Drill Indicated Ore for Block C.

PF - Handout at Roundup Jan 1992
093L 002

THE OWEN LAKE EPITHERMAL VEIN PROJECT

A 3-YEAR COOPERATIVE RESEARCH PROJECT FUNDED BY NSERC AND INDUSTRY

in

The Department of Geological Sciences
The University of British Columbia
Vancouver, B. C. V6T 2B4

INDUSTRIAL PARTICIPANTS: Pacific Houston Metal Corp.
New Nadina Explorations Ltd.

RESEARCH TEAM: Dr. A. J. Sinclair, Principal Investigator
Dr. M. Thomson, Post-doc. Fellow 1990-92
Dr. C. Leitch, Post-doc. Fellow 1989-90
Mr. C. T. Hood, Tech. Research Asst.
Mr. X. Cheng, Ph. D. candidate

INTRODUCTION

Silver Queen mine is centered on a series of epithermal precious- and base-metal veins located about 40 km. southeast of Houston, B.C. Veins are hosted by northwesterly dipping Cretaceous rocks of the Tip Top Hill volcanics, with most of the major mineralized structures trending northwesterly. Several smaller, east-west trending, silver-rich veins are also present in the vicinity of the minesite. The largest known vein structure on the property, the Number Three/NG3 structure, accounts for most of the known reserves at Silver Queen.

Although activity at these deposits has spanned over 70 years, comprehensive studies of the nature of mineralization at the mine have been undertaken only recently. The following represents the results of detailed examination of vein mineralogy and geochemical analysis of the associated altered rocks. A genetic model consistent with available geological and geochemical information is described.

VEIN MINERALOGY AND PARAGENESIS

Veins at the Silver Queen mine most typically display textures indicative of simple crustiform growth with prominent layers dominated by individual minerals some of which produce spectacular exposures. In a number of sites (in particular, the Number Three vein), the veins are much more complex, including internal and wallrock breccias, stringers, and sites displaying multiple positions of vein re-opening. The presence of these complex vein segments makes identification of a consistent paragenetic sequence difficult without a detailed microscopy study.

The Number Three vein, which is accessible via underground workings, is the vein on which much of the mineralogic study is centered. Assemblages in the structure can roughly be divided into four major paragenetic "stages", separated by lulls in mineralization and/or a change in the mineralogy. The assemblages within the first three stages also show variability along the length of the vein and with increasing distance from the Number Three vein.

Stage I is dominated by an initial fine-grained quartz-pyrite episode followed by much coarser-grained pyrite and quartz. Barite, svanbergite, and hinsdalite are also abundant in the southern part of the vein, with hematite abundant in the central segment and marcasite in the northern part.

Stage II is dominated by sphalerite and carbonate minerals, with lesser amounts of pyrite and quartz present. Coarse-grained, euhedral galena and more importantly, bladed barite, also occur within the Stage II assemblage in veins distal to the southern part of the Number Three vein. Stage II carbonate minerals also vary compositionally from south to north, becoming more Mn-rich towards the northernmost positions.

Stage III is the most complex of the paragenetic events and includes a diverse sulfosalt assemblage dominated by tetrahedrite. In the northern part of the Number Three vein, chalcopyrite and quartz are the most important Stage III minerals; in the south, galena and tetrahedrite-tennantite are widespread. Sulfosalt minerals, in particular berryite and aikinite, are locally important. Silver sulfosalts increase in abundance in veins most widely separated from the main structure.

Stage IV is volumetrically unimportant, consisting mainly of diminutive quartz, carbonate, and bitumen stringers.

SPHALERITE COMPOSITIONAL VARIATION

Sphalerite forms the most important sulfide component of Stage II mineralization and is a potential host for a number of elements. Of particular interest at Silver Queen is the presence of anomalous (up to 2000 ppm) amounts of the unusual elements gallium, germanium, and indium. No independent phases for these elements were identified during mineralogic analysis, therefore, the most likely source for these elements was considered to be sphalerite. Sphalerites from twelve localities on the Number Three/NG3 system and smaller veins were analyzed, with compositional variation occurring both in single grains and from site to site. Sphalerite from the Number Three vein is relatively Fe-poor, with colour variations commonly generated by minute chalcopyrite inclusions selectively replacing zones (possibly formerly more Fe-rich). Iron contents are highest in the northernmost parts of the Number Three vein, generally where chalcopyrite is abundant within the Stage III assemblage. Gallium, Germanium, and Indium were all identified in sphalerite, although only In was found to be relatively restricted in occurrence (in association with chalcopyrite in the deep north Number Three vein). Elevated contents of Ga, Ge, Cd, and Mn are present in sphalerite from the southernmost intersection of the NG3 vein.

TETRAHEDRITE COMPOSITIONAL VARIATION

Tetrahedrite-tennantite series minerals represent a ubiquitous component of Stage III mineralization and display a wide compositional heterogeneity for several elements:

$$[(\mathbf{Cu,Ag})_6Cu_4(\mathbf{Fe,Zn},Hg,Pb,Ag,Cu)_2]\ (\mathbf{As,Sb,Bi})_4\ (S)_{13}$$

Tetrahedrites were analyzed by electron microprobe for a number of these elements, with variations noted on single grain and deposit scales. In general, compositional variability occurs in three sites, shown in bold face in the above formula. Each crystallographic site is evaluated as an atomic ratio [e.g. Ag/(Ag+Cu), As/(As+Sb+Bi), Zn/(Zn+Fe)], with values plotted for a number of sample sites along the main structure and smaller associated veins to demonstrate zoning.

For the Number Three vein, variability was noted to occur along both horizontal and vertical sample profiles. The ratio Ag/(Ag+Cu) increases towards the highest and northernmost sample sites in the main structure, in the vicinity of the decline intersection, and in smaller veins along the margins of the system (Camp, Owl, and Cole). An opposite trend occurs in As/(As+Sb+Bi), where the ratio decreases in samples with high Ag/(Ag+Cu). The Zn/(Zn+Fe) ratio shows a lesser degree of heterogeneity; the lowest values are found along the margins of the known mineralized area.

An interesting side note to the tetrahedrite analyses is the widespread occurrence of Bi-enriched tetrahedrites, particularly in association with bismuthian sulfosalts. Individual grains commonly display crystal zoning in S.E.M. photomicrographs, reflecting large fluctuations in bismuth content within the grain.

The variation of major and trace elements in Silver Queen tetrahedrites is important in several ways. Unusual enrichments or depletions of a particular element (usually bismuth) help define the compositional parameters of the mineralizing fluids at a given locale. Zoning in individual grains indicates that a (compositionally) wildly fluctuating hydrothermal environment existed at many sites. More importantly, variations in Ag/(Ag+Cu) and As/(As+Sb+Bi) suggest that fluid migration consisted of both horizontal and vertical components originating from a deeply buried heat source in the southern part of the property (since As-Cu-rich compositions are predicted to deposit closest to the fluid source). Coprecipitation with sulfosalt minerals may have resulted in unusually Ag-rich or Ag-poor compositions near the decline intersection and in the deep north part of the Number Three vein.

HYDROTHERMAL ALTERATION

Hydrothermal alteration, long recognized both as a guide to ore and as an indicator of the character of hydrothermal solutions associated with ore deposition, has not been studied previously at the Owen Lake deposits. Our current study focuses on geochemical variation of alteration envelope of the Silver Queen veins. Data are XRF analyses of whole rock samples collected from northern, central and southern cross-sections of No. 3 vein on the 2600-foot underground level.

The closure effect (summation to 100%) distorts the true geochemical variations. For example, if one component is immobile during alteration, its concentration will appear enriched or diluted depending on the total loss or gain of other components. To remedy the closure effect we must identify an immobile component with which to convert analytical data from intensive concentrations to extensive quantities. Then, we can compare the data of altered rock with that of a precusor rock to investigate the loss or gain of each component during hydrothermal processes.

The ratio of two immobile components will remain constant for all stages of alteration, and this characteristic allows us to identify immobility in some cases. By using this criteria Zr and TiO_2 have been determined to be immobile for the Silver Queen data .

The foregoing approach indicates that the intensity of silicification decreases dramatically from south to north. The strongly altered rock of the southern cross section has twice the SiO_2 content of weakly altered wall rock, whereas the northern segment shows almost no change in SiO_2 in alteration envelope.

The moderately altered and strongly altered envelopes of all cross sections are characterized by remarkable losses of CaO and Na_2O. Similarly, gains in volatile components (including H2O, CO2 and S etc.) are pronounced. The gain of K_2O is similar to that of SiO_2. At southern cross section the addition of K_2O from hydrothermal solution to wall rock is most intense. At the central cross section a trough on the K2O plot around the strongly altered alteration envelope implies that an argillic alteration might have overprinted a potassic alteration. Potassic alteration at the northern cross section is almost insignificant. Fe2O3 and FeO more-or-less compensate for each other indicating little change in total iron content except very close to the vein.

In summary, a few conclusions can be drawn as follows:

(1) Weakly altered rock was not influenced significantly by hydrothermal solutions associated with mineralization. The moderate and strong alteration envelopes are the product of extensive metasomatism associated with mineralization.

(2) Alteration types vary from strong silicification, potassic alteration and pyritization at the south; to argillic alteration overlapping silicification, potassic alteration and pyritization at the central segment; to argillic alteration and weak pyritization at the north.

(3) Based on mass changes of wall rock during alteration the composition of hydrothermal solution is deduced as Si and K saturated, with significant base and precious metals, S and CO_2.

DEPOSIT MODEL

The mineralized system at Silver Queen mine displays several characteristics attributable to evolution in an epithermal environment. Stabilities of primary marcasite and the assemblage galena-matildite indicate that the temperature of mineral deposition was probably at or less than 250^{o} C., with the lack of a metamorphic overprint or remobilization suggestive of pressures of less than 800 bars. However, the system becomes atypical when compared to other examples of fossil hydrothermal systems. The occurrence within an intermediate volcanic sequence, coupled with the disparity of ages between mineralization and host rocks, is suggestive of an "adularia-sericite" type of system typified by the deposit at Creede, CO. One important distinction from adularia-sericite systems, however, is the lack of adularia within the vein and alteration assemblages. Additionally, the presence of a number of bismuthian sulfosalt species, including bismuthinite, is indicative of conditions associated with an "acid-sulfate" system.

In fact, the mineralizing system at Silver Queen may have involved several fluids of differing compositions. A lack of textures associated with a boiling mechanism suggests that a mixing of cooler, less saline meteoric waters with heated, metal-charged fluids was the dominant control on mineralization. An acidic pH is inferred by the presence of primary marcasite within the vein, and by kaolinite in the wallrock. The abundance of carbonate minerals, however, attests to the importance of a more neutral bicarbonate fluid during Stage II mineralization. The increased distance from the fluid source, coupled with elevated levels of interaction with more oxidized groundwaters, resulted in the generation of an early Stage II barite in the peripheral veins at Silver Queen.

Source of metals is uncertain but provenance is largely external to the volcanic host sequence. Elevated contents of Ge and Ga, and the presence of pyrobitumen suggest a significant mass contribution from underlying organic-rich sediments.

ACKNOWLEDGEMENTS

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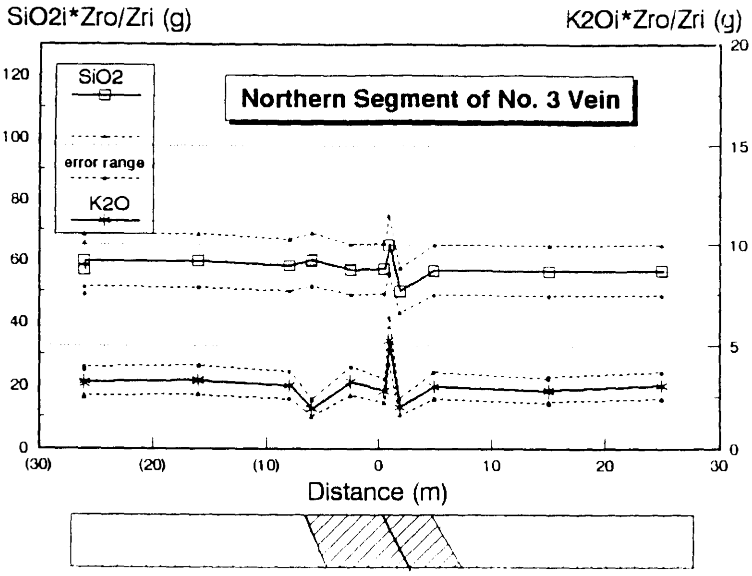
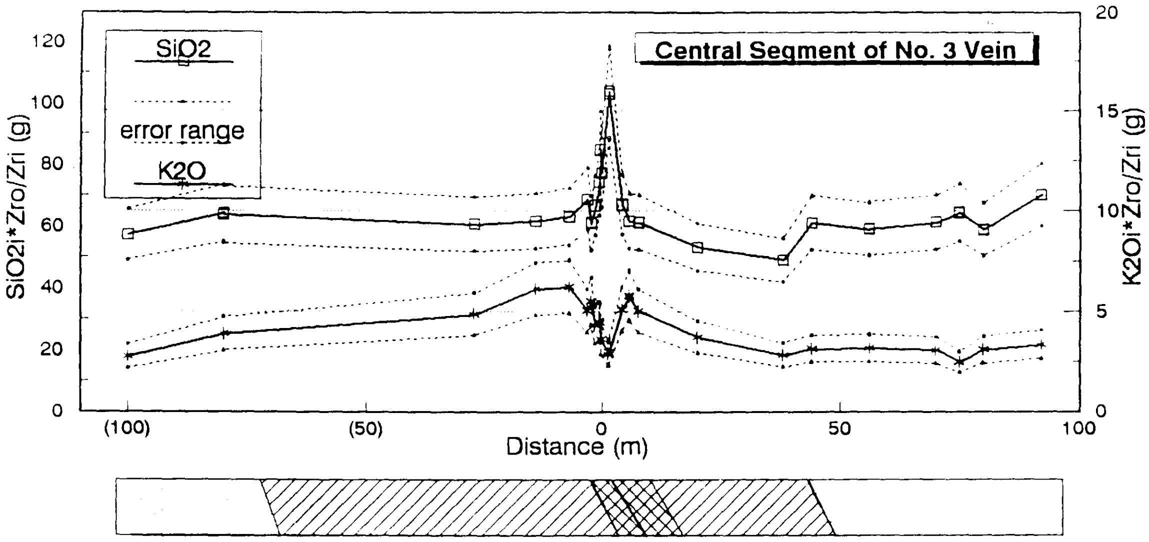
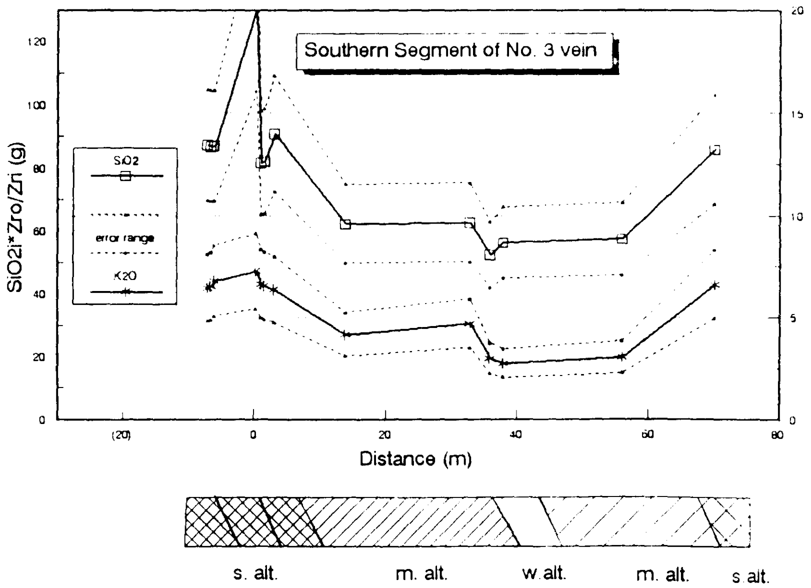
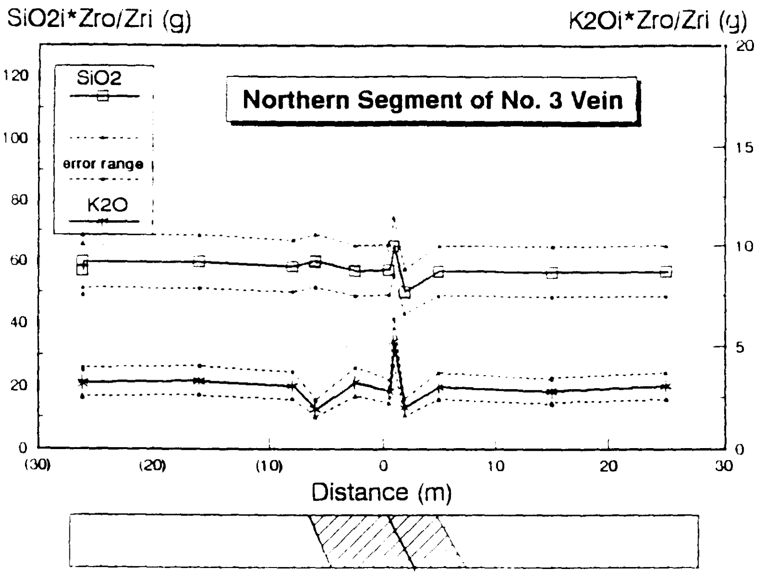
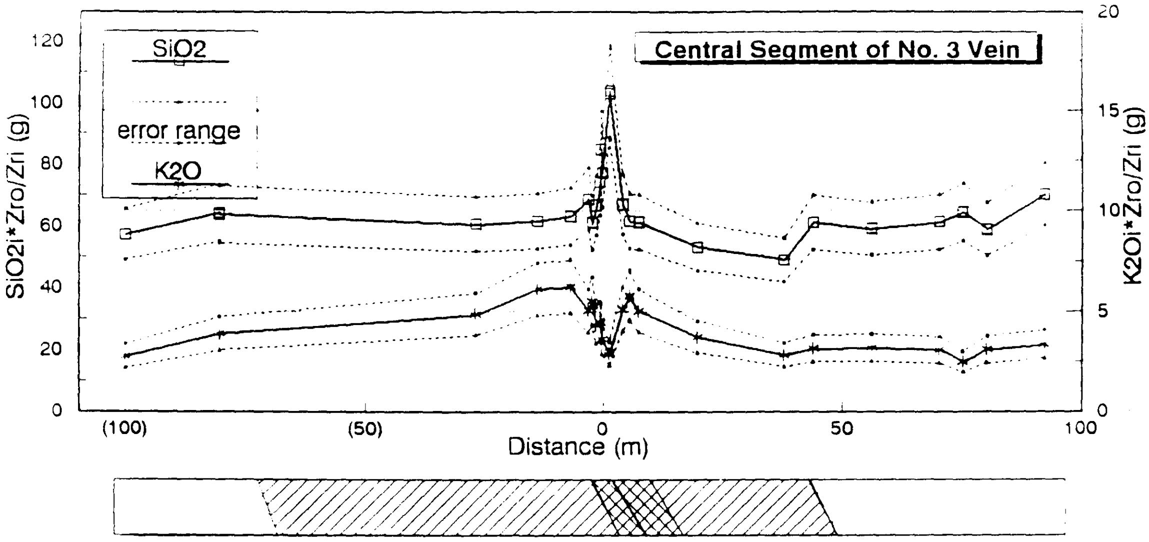


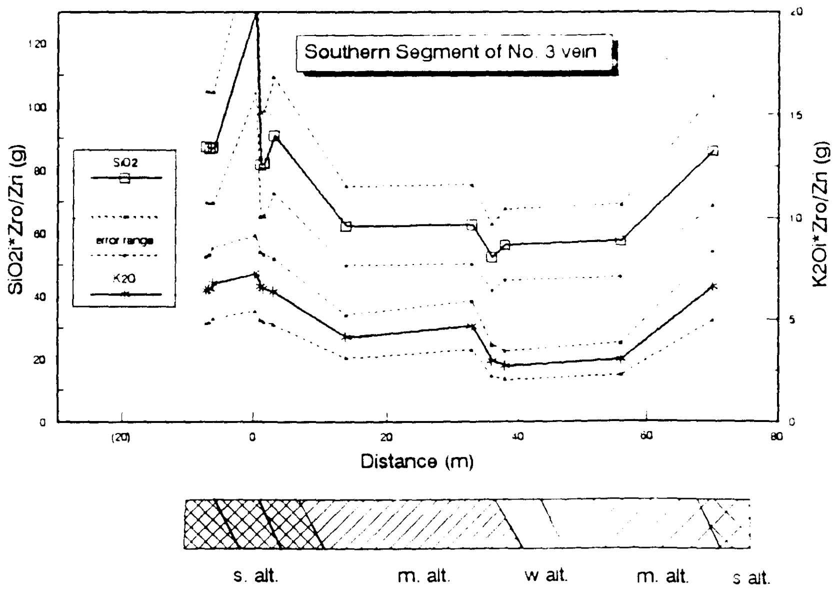




This set of diagrams indicate that the depletion of Na2O in alteration envelope is almost complete. The depletion and addition of CaO varies systematically from southern to northern segment.

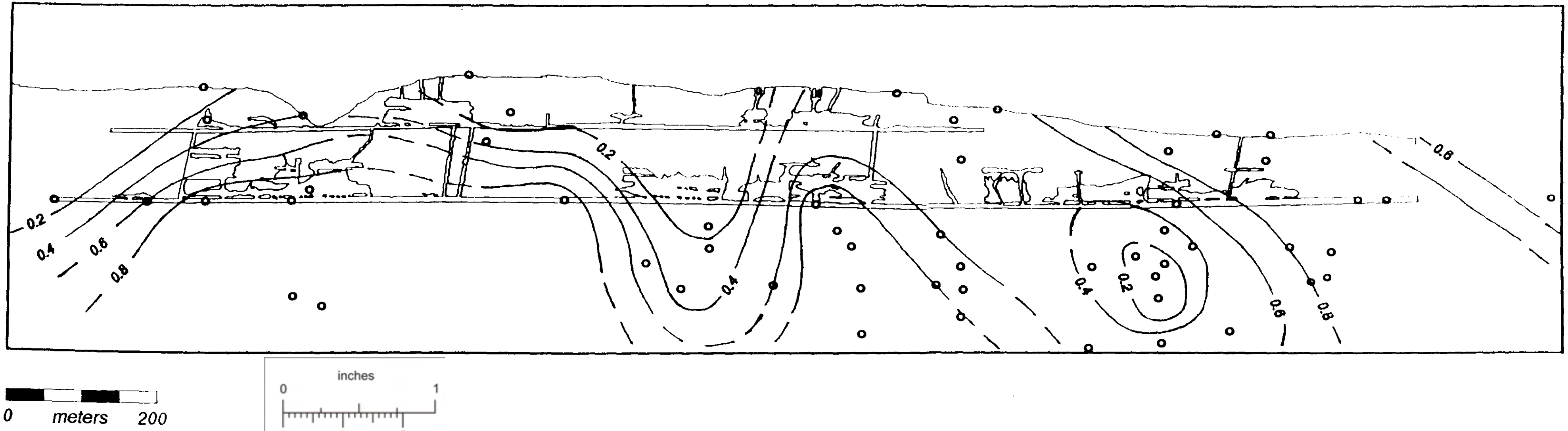






This set of diagrams show that the intensity of silicification varies from strong to weak from southern to northern segment. The addition of potassium has a similar variation pattern.

CONTOUR PLOT OF As/(As+Sb+Bi) FOR TETRAHEDRITE GRAIN "CORES"
NUMBER THREE VEIN LONGITUDINAL SECTION



inches
0 1
0 1 2
centimetres

This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.

CONTOUR PLOT OF Ag/(Ag+Cu) FOR TETRAHEDRITE GRAIN "CORES"
NUMBER THREE VEIN LONGITUDINAL SECTION