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SEIGEL ASSOCIATES LIMITED
GEOPHYSICAL CONSULTANTS & CONTRACTORS
A DIVISION OF SCINTREX LIMITED

October 7, 1969

Mercury Explorations Limited
700 - 1281 West Georgia Street
Vancouver 5, B. C.

Dear Sirs:

Re: Evaluation of Reconnaissance Induced Polarization Results
Endako area, British Columbia

The results of some 60 line miles of frequency domain induced polarization and resistivity results have been submitted for my perusal by Mr. Robert Chapman, P.Eng., and Mr. Mauro Beretta of your firm. The data cover parts of the TAT, COUNT, CHESS, BONUS and BET claim groups which lie in an area about 50 miles in length in a northwesterly-southeasterly direction by 25 miles in width centred north of the Endako Mine.

The geology and geochemistry of the area have been studied by your company and were used as a guide to determine which areas would be covered by induced polarization surveying. Much of the project area is underlain by rocks of the Topley intrusive which is a composite batholith containing a range of acidic rocks primarily quartz monzonites and quartz diorites. A map of the project area showing the known geology, molybdenum-copper geochemical soil anomalies as well as the locations of the claim groups and survey lines on a scale of 1" = $\frac{1}{2}$ mile has been supplied to the writer. The writer is not familiar with the detailed geology or geochemistry of the individual claim groups although since most of the area is covered by glacial till such information is likely sparse or nonexistent.

Since the goal of the present project is to locate an ore body similar to that presently being mined by Endako Mines Ltd., orientation induced polarization resistivity profiles were executed over the main ore body as well as the nearby "Julian Zone". While this coverage is not extensive enough to allow quantitative determination of the geophysical parameters of the entire ore body, the results may be used as a guide in examining the reconnaissance geophysical data. The frequencies which were employed for the tests as well as the reconnaissance surveying were 10.0 and 0.1 cps. The electrode array was pole-dipole with a 400' electrode separation for most of the observations taken.

The test results indicate that with a background percent frequency effect (P.F.E.) of less than 4.0, peak responses over the ore body range from 6.0 to 16.0 per cent. It is noted that there was very little or no overburden in the area where these traverses were carried such that a similar body at greater depth would be expected to give lesser peak responses. The apparent resistivities in the area of the ore zone range from 200 - 600 ohm-metres with a median value of approximately 400 ohm-metres. It is noted as well that the apparent resistivity values may be affected as much by changes in the type or depth of the overburden as by changes in the character of the bedrock. These responses are quite typical of large tonnage low-grade deposits which are found in acidic intrusive rocks in British Columbia. Brenda Mines, Valley Copper Mines and Highmont Mines are three other ore bodies which give similar induced polarization responses. All of these deposits have very low total sulphide content and are discernible from the surrounding barren rocks by the induced polarization method, however, one must be prepared to investigate very slight rises in P.F.E.

The technique used to gather the present induced polarization data was designed as an efficient reconnaissance technique to cover areas of geological and geochemical interest. In most of the claim blocks the distance between parallel survey lines ranges from 500' to as much as one mile. The distance between readings on the lines is generally 400' and the pole-dipole array with a 400' electrode spacing was employed. The present state of the art allows quantitative interpretation of induced polarization surveys to give estimates of the location, attitude, depth below surface and possible metallically conducting content of anomalous zones. Such interpretations, however, require a far greater density of data values than are available from the reconnaissance work. It would therefore most likely be wise to return to the areas interpreted as anomalous from the reconnaissance survey and take more detailed measurements prior to undertaking diamond drilling.

Care must be taken in using contours (particularly those prepared from widely separated data points) to interpret the location of the bodies causing the highest chargeabilities. Because of the asymmetry of the electrode array used, profiles are usually best for interpretive purposes and additional traverses employing differing electrode separations are necessary for good quantitative interpretation.

Assuming that the geology of all of the survey areas is similar to that of the Endako Mine, or at least that the predominant underlying rock type is an acid intrusive rock, we may consider background P.F.E.'s to lie in the 2.0 to 4.0 per cent range. Since very low concentrations of molybdenum bearing sulphides may be of economic interest, P.F.E. increases only slightly in excess of 4.0 may warrant further investigation. Initially, a minimum of at least two observations of 6.0 P.F.E. or greater along any given profile should be subjected to detailed induced polarization coverage.

Since it is desirable to have good ground control for interpretation of the induced polarization data as well as subsequent drilling, it is recommended that a limited amount of line cutting be undertaken for each detail project. Such line cutting would be done in advance of the arrival of the induced polarization survey crew and would consist of locating the anomalous stations on the reconnaissance profile, cutting a baseline perpendicular to the profile at least 500' on either side of it, then cutting three lines each 2000' in length and 500' apart. The centre line of the three would correspond to the reconnaissance profile. These lines could then be covered using the three electrode array with 200' and 400' electrode separations simultaneously. The station interval should be 200'.

There is a continuing rivalry between protagonists of the time domain and frequency domain induced polarization methods. It is clear that neither method is superior in all respects to the other, however in the present environment it is thought that the time domain technique may have certain advantages over the frequency domain technique. In areas of low induced polarization responses it has been shown that time domain measurements can be taken to greater accuracy than frequency domain measurements. In addition, in areas of low resistivity the electromagnetic response of the earth may become a large percentage of the observed P.F.E. in frequency domain measurements. An upper frequency of 10.0 cps was used for the present survey after tests on the Endako ore body showed that it gave the best response to the mineralization. Theoretical studies show that for this frequency and the pole-dipole array, electromagnetic coupling may become important when resistivities drop into the 25 ohm-metre range. While very few of the apparent resistivities taken during the present project are this low, it is quite possible that in places low resistivity near-surface layers may give electromagnetic responses which are indistinguishable from true induced polarization responses due to subsurface concentrations of metallically conducting mineralization. It is therefore recommended that time domain induced polarization equipment be considered for any detailed surveying. Alternatively, it would probably be wise to reduce the upper frequency of the frequency domain instrumentation.

Without detailed knowledge of the geology or geochemistry, the following locations have been chosen from the induced polarization-resistivity profiles as being worthy of further investigation. Since the data are not sufficient to allow precise quantitative interpretation, and since very low amplitude P.F.E. increases may be of interest, the writer cannot place these in any relative order of priority. When these recommendations are compared with the known geology and geochemistry, a definite order of priority may emerge.

TAT Group:	LT-1, 10S LT-1, 40S LT-S, 10N
COUNT Group:	L0, 25N L 3.75E, 41S
CHESS:	Nil
BONUS:	LUG, 0 L SUGE, 0
BET	LB-1, 48NE.

The data which you have given me is being returned under separate cover. I hope that my comments will be of assistance to you and thank you very much for allowing me to undertake this review.

Yours very truly,

SEIGEL ASSOCIATES LIMITED

J. G. Baird per ef

Jon G. Baird, B.Sc., P.Eng.
Geophysicist

JGB/ef