

June 28.

Mr. P. J. Brown.

006198

I just received 22 more samples
(your P.O. 37171). I will not
do any further work until I
receive your comments on the
first two Pb conc. samples

Because of the time and expense
involved. (The charges for the enclosed
work are \$300 to be billed by UBC. later)

R. G. B.

THE UNIVERSITY OF BRITISH COLUMBIA

VANCOUVER 8, CANADA

DEPARTMENT OF METALLURGY

June 28, 1974

Mr. P. J. Brown
Chief Metallurgist
Anvil Mining Corporation Ltd.
Box 1000
Faro, Yukon Territory

Dear Sir:

Enclosed please find three microprobe charts and eight photographs pertaining to the two composite lead concentrate samples sent here for analysis on your purchase order no. 36879.

As we discussed on the telephone, I felt that there was no hope of finding any silver in your concentrate if the silver were uniformly distributed in solid solution in the galena, but there might be some change of finding silver if it were present in relatively high concentration in some minor mineral.

To this end, I mounted portions of the two samples in epoxy, polished them, evaporated a thin carbon coating on them, and proceeded to search for any grains showing a detectable amount of silver using the electron beam microprobe.

In order to involve as many mineral grains as possible, I used a defocused electron beam of about 50 microns diameter and slowly traversed the specimens under the beam while recording the emission of silver L_{α} radiation from the specimens.

Since two spectrometers are available on the microprobe, I recorded the output due to one other element simultaneously with that of the silver.

Chart No. 2 is the result of the scan of the December composite sample. In this case the other element analysed was copper. Both logarithmic and linear output plots were used.

You will observe that for this sample the silver output is extremely low and that no "hot spots" are viaible (best seen on the linear output portion of the plot). The output is of a value consistant with the normal background expected and the slight fluctuations can be attributed to the fact that the background count can be expected to change slightly when the beam passes from a low atomic number material (epoxy) to a high atomic number material (PbS).

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A similar scan was made on the January composite sample but the second element plotted in this case was lead. You will notice on chart number 1 that at least in one place the silver count went as high as 10 counts per second. You will also notice that the general background for silver seems to follow the lead output, which is to be expected.

By backtracking the specimen to the place where the highest silver output was detected and by making a high magnification search for silver (using a 1/2 micron electron beam and the cathode ray viewing screen), a single, very small, silver rich grain was found (photo 1). A back scattered electron image (photo 2) of the area showed the presence of a particle almost beyond the resolution of the microprobe.

An elemental scan of the grain (using both spectrometers, - see Chart Number 3) indicated the presence of Mn, Ag, Pb, Zn, Cu, Fe, S, and Sb. Since the grain being analysed was so small, it could be expected that many of the elements detected were present in adjacent grains. X-ray image photographs were made for most of the detected elements (see photos 3 to 8) and it was concluded that only antimony and possibly copper was to be found in the exact area containing the silver. Although the grain of interest was too small for a quantitative analysis, it is possible that its silver content could be as high as 30%.

A subsequent search for grains of mineral rich in antimony revealed a few such grains but all but one seemed not to contain any detectable silver. One, fairly large, antimony rich grain did indicate the presence of a detectable trace of silver.

Considering the fact that the electron microprobe used as outlined above has a detection limit for silver of about 0.05 to 0.1%, and considering that your concentrate may have a total silver content of about the same value, I feel that the presence of a relatively small number of grains of antimony based minerals containing fairly large amounts of silver could account for a significant amount of the silver found in your concentrate.

The mineral Tetrhedrite ($3\text{Cu}_2\text{S}$, Sb_2S_3) is known to carry up to 30% silver (Freibergite) and, I am told, can also be a very difficult mineral to float.

In the light of this data, I would suggest that you should try to correlate your silver recovery with the antimony assay of your concentrate and tailings. Should such a correlation exist, then suitable mineral dressing adjustment would be indicated.

Yours truly,



R. G. Butters

Enclosure
RGB/slh