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Mr. Brian Fowler
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Dear Brian:

I hope all is going well with your Ontario work and your obligations to the CIM Special Volume.

As per our telephone discussion, I enclose information concerning the lithochemical methods of analysis used in the GSC Mitchell-Sulphurets study of surface rock and drill core samples.

I will explain the analytical methods used in this study. The rock samples were crushed and ground (ceramic ball-mill) and split into three separate sample vials. The vials were then sent to 3 different laboratory services.

One vial was sent to a commercial laboratory for delayed neutron activation analysis (NAA). The sample weight used for NAA is approximately 10.0 g. We used the NAA gold plus methods because it is non destructive. After a cool down period, the returned sample material could undergo check analysis for a particular element by some different method or assay technique. Heavy mineral separations could be made from the sample thus determining the exact mineralogy and/or mineral chemistry which contributed to the NAA results. Because NAA consistently provided accurate and precise results, the data was particularly important for the GSC lithochemical study of the following elements: Au, Ag, As, Sb, Ba, Mo, W, U, Th. Elements such as: Te, Se, Cd may be accurate if listed positively but they may suffer from problem matrix affects. Treat all data with a minus sign in front of it as detection limit values or values not accurately reported due to problem matrix affects. All negative signed data should be disregarded. Under no circumstances should negative values which are greater than the detection limit be used as a real values. The cost of all analyses was borne by the GSC.

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All other data presented was analyzed by the Analytical Chemistry Laboratories of the GSC in Ottawa.

Major element analysis were completed by fused disk wavelength dispersive X-Ray Fluorescence (XRF) for all samples containing less than 5% S or samples containing less than one percent copper or lead. The trace elements Ba, Nb, Rb, Sr, Zr were also determined during XRF analysis.

Supplementary whole rock determination of volatiles was also completed to ensure whole rock compositions approaching 100% by weight. All of the data provided are "raw" results i.e. not normalized but "true" values. Ferrous iron was determined using the Wilson Method (titrimetric) while H₂O (Total), CO₂ (Total) and S were determined using combustion followed by infra-red spectrometry. It is important to note that when samples were found to contain sulphur contents greater than 5% S or significant amounts of barite or percent levels of copper lead, the XRF methods were not used for whole rock analysis. In the above case, the major elements were determined by ICP emission spectrometry after the sample was fused with a mixed lithium-metaborate-lithium tetraborate flux followed by dissolution of the fusion melt. Ferrous iron results are only reported for samples which have less than 1% S. These samples therefore may be viewed as the least altered in this data set but they may contain abundant CO₂ indicating intense carbonate alteration. In this study area, one would be hard pressed to suggest that a rock sample is truly unaltered when all of the lithochemistry data for the sample is taken into account!

Trace elements Rb, Sr, Nb, Zr, and Ba, Be, Co, Cr, Cu, La, Ni, Sc, Y, V, Yb and Zn were also analyzed using ICP Emission Spectrometry based on the TOTAL dissolution of a one gram sample using a mixed-acid digestion using nitric, perchloric and hydrofluoric acids followed by a lithium metaborate fusion of any residual material.

Ag and Pb were determined by flame atomic adsorption spectrometry.

In the major minor and trace element listings provided, the method after the element and concentration headers is listed as XRF. However, the method of determination may have been or was in fact ICP-ES or AA depending on the circumstances of the sample matrix as set out in the foregoing discussion.

The data provided includes fluorine, chlorine and sulphur in rocks as determined using a pyrohydrolysis method followed by ion chromatography (Dionex). This method measures these three elements simultaneously and requires 0.2 grams of sample. Since S has a limit of determination of 100 ppm this method provides an accurate low level S content in fresh unaltered rocks and is a check of the sulphur (total) as determined by infra-red spectrometry method.

At Mitchell-Sulphurets, Aerodat completed a helicopter borne geophysical survey which included airborne radiometric measurements for K, U and Th. After GSC whole rock K₂O, and NAA, U and Th data were provided to Mr. T. Ransom of Corona the spectrometry survey was added. During our discussions with Tony, we presented the possibility of mapping

geologic units by radiometric patterns and more importantly, perhaps, vectoring alteration intensity using potassium values.

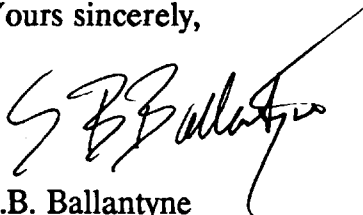
Aerodat's Doug Pitcher was most impressed by the 1200 plus surface rock sample sites (i.e. control) in the Mitchell-Sulphurets GSC study area. Plotting using the SPANS, spatial analysis system of whole rock K_2O , U, Th and their ratios depict impressive anomalous patterns.

We would like to compare the airborne data and the lithochemical data, especially, K, U, and Th patterns. As you may know (please find enclosed 1993 survey area maps of B.C. and Yukon) the GSC is conducting EDA or MDA funded 500 m radiometric, magnetic and VLF surveys at 1:50,000 scale in Yukon and B.C. In the flat areas the GSC Skyvan fixed-winged aircraft does the work and this year, for the first time, in more mountainous terrain contracted helicopter surveys (not unlike the Mitchell-Sulphurets survey) are also being conducted under the scientific direction of the GSC (R. Shives). These data will of course be made available both in map and flight line hardcopy and in digital form in GSC Open File Reports (see Mt. Milligan survey GSC Open File 2535) and released ASAP under the appropriate Mineral Development Agreement (MDA).

As previously mentioned, I was first approached by Doug Pitcher regarding a cooperative evaluation of the lithochemical data and the airborne gamma ray spectrometry results for Mitchell-Sulphurets. I have also sent a formal letter to Ron Britten, Homestake Canada Ltd. and Fred Hewitt, Newhawk Gold Mines. During previous discussions there was agreement with the idea. I am writing a formal letter to each Mitchell-Sulphurets participant regarding authorization to approach Aerodat for the release of Mitchell-Sulphurets digital data for GSC research purposes. If you are in agreement please advise in writing so that we may implement the testing of GSC processing and output procedures on mountainous derived data.

If you have any questions regarding this request or with the lithochemical data provided please contact me at the enclosed business card phone or FAX number.

Yours sincerely,



S.B. Ballantyne

SBB/mab

c.c. R.V. Kirkham
D.C. Harris
R. Shives