



601 Booth Street  
Ottawa, Ontario  
K1A 0E8

Dave:

I have kept  
copy here, and  
put in NHG/GSC  
files.

29/6/93

Please tell me if we should  
cooperate, at no cost. Discuss  
with Ron and let me know,  
and get back to Bruce.

June 21, 1993

Mr. F.G. Hewett

Mr. D. Visagie

Newhawk Gold Mines Ltd.  
860, 625 Howe Street  
Vancouver, British Columbia  
V6C 2T6

Dear Fred and Dave:

I enclose a copy of all GSC lithogeochemical data for old ESSO Map three area, Mitchell-Sulphurets, namely 47 pages.

At one time or another all of this data was prepared and sent in a different form to Newhawk Gold Mines and Corona. For this enclosed listing, which includes the Snowfield Gold Zone, the 206 samples were collected by R.V. Kirkham, D.C. Harris or myself during our mapping and surface sampling program.

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. The actual weights are listed on pages 25-30. The data for all of the elements measured in the gold plus analytical package are presented on pages 1-25. 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 lithogeochemical 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.

The data presented in the columns on pages 25-36 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 H<sub>2</sub>O (Total), CO<sub>2</sub> (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 CO<sub>2</sub> 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.

Please note that AA determination of Ag and Pb are not available for all samples (see page 31-42).

Pages 43-48 include 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.

I hope that this complete data set will be of exploration value in your further efforts to define and delineate ore zones, alteration patterns and geologic units in the map three area of Mitchell-Sulphurets.

At Mitchell-Sulphurets, Aerodat completed a helicopter borne geophysical survey which included airborne radiometric measurements for K, U and Th. After GSC whole rock  $K_2O$ , 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 lithogeochemical 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 lithogeochemical data and the airborne gamma ray spectrometry results for Mitchell-Sulphurets. I have just sent a letter and this same data package to Ron Britten Homestake Canada Ltd. I am writing a formal letter to each Mitchell-Sulphurets participants 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 lithogeochemical data provided please contact me at the enclosed business card phone or FAX number.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'S.B. Ballantyne', with a long vertical stroke extending downwards from the end of the signature.

S.B. Ballantyne





SBB/mab

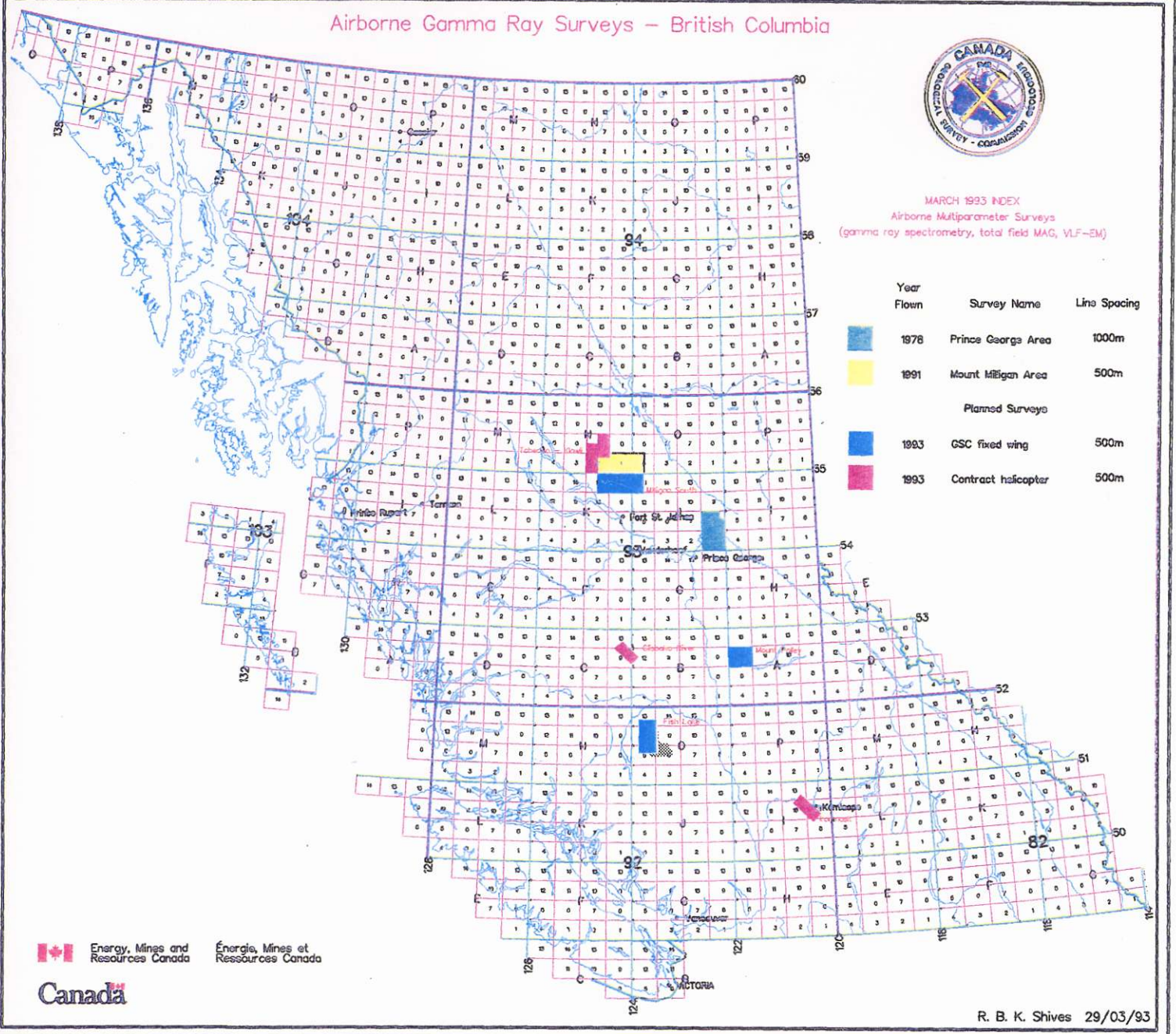
c.c. R.V. Kirkham  
D.C. Harris  
R. Shives


# Airborne Gamma Ray Surveys – British Columbia



MARCH 1993 INDEX  
 Airborne Multiparameter Surveys  
 (gamma ray spectrometry, total field MAG, VLF-EM)

Year Flown	Survey Name	Line Spacing
	1978 Prince George Area	1000m
	1991 Mount Miligan Area	500m
	Planned Surveys	
	1993 GSC fixed wing	500m
	1993 Contract helicopter	500m



 Energy, Mines and Resources Canada  
 Énergie, Mines et Ressources Canada



R. B. K. Shives 29/03/93