Airborne Gamma-Ray Spectrometric and Magnetic Surveys over the Bonaparte Lake Area (NTS 092P), South-Central British Columbia[1]

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KEYWORDS: geophysics, spectrometric, radiometric, aeromagnetic, magnetic, copper porphyry, skarn

INTRODUCTION

Airborne gamma-ray spectrometric and magnetic geophysical surveying is underway over the Bonaparte Lake area, British Columbia, in the eastern half of NTS 092P (Fig 1). The survey is funded by Geoscience BC, Natural Resources Canada's Targeted Geoscience Initiative (TGI3), Candorado Operating Company Ltd., G W R Resources Inc. and Amarc Resources Ltd. Surveying consists of a fixed-wing component over the flatter western portion and a helicopter-borne component over the more rugged eastern portion (Fig 1) of the survey area. The aim of the project is to encourage new private sector investment in resource exploration, to aid in the assessment and development of targets for mineral exploration and to support future bedrock and surficial geological mapping. These objectives fall within the mandate of Geoscience BC, as well as the scope of the TGI3 Program.

PURPOSE AND SCOPE

The Bonaparte Lake area in south-central BC (Fig 1) is prospective for a number of mineral deposit types, particularly copper porphyry. However, an extensive Quaternary cover, Tertiary volcanic cover and a lack of public domain geophysical data have resulted in limited exploration in the region.

Airborne gamma-ray spectrometry provides a physical measurement that contributes to geochemical mapping of the top 30 cm of the earth's surface. The technique provides bedrock and overburden mapping assistance by fingerprinting the radioactive element signatures inherent in all rocks and soils. Where the normal signatures are disrupted by mineralizing processes, anomalies provide direct exploration vectors.

Aeromagnetic surveys provide structural and lithological information from rocks located at surface down to considerable depths. In the area of the proposed surveys, the technique allows the determination of magnetic source depths, key to understanding lithology and mineral potential under the extensive cover sequences.

Figure 1. Location of the Bonaparte Lake area, south-central BC.

When these two techniques are integrated into a single-pass airborne survey, they provide complementary information that serves as a long-standing geophysical-geochemical framework, supporting new geological and practical mineral exploration models for a wide variety of commodities. For example, similar surveys recently conducted in areas adjacent to the proposed surveys have improved geological understanding and exploration for porphyry Cu-Au, skarn and other deposit types.

METHOD

Requests for Proposals were generated by the Geological Survey of Canada (GSC) on behalf of the survey partners for completion of the surveys. The contracts were awarded to Sander Geophysics Limited of Ottawa (fixed-wing) and Fugro Airborne Surveys of Toronto (helicopter). Surveying began on September 15, 2006.

The fixed-wing survey (Fig 2) was flown with a Britten-Norman Islander™ (C-GSGX) and consists of 13 968 line km covering the survey area. The traverse flight-line spacing was 400 m, except in the Rayfield and Amarc blocks (Fig 2, areas B and C of the fixed-wing area)

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[1] *Geoscience BC contribution GBC027*

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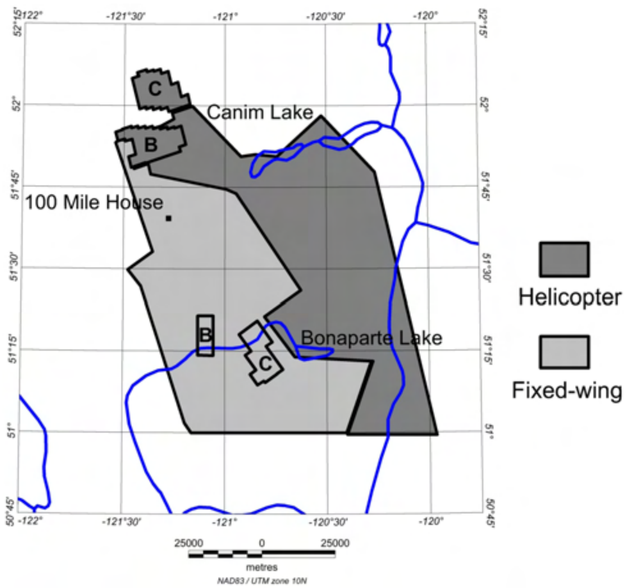

Figure 2. Bonaparte Lake survey boundaries.

where the line spacing was 200 m. All traverse lines have a N55°E orientation. The control line spacing was 2400 m, oriented perpendicular to the traverse lines. The survey altitude was a nominal mean terrain clearance of 125 m on a predetermined smooth draped surface. Gamma-ray spectrometric data were recorded at 1.0 second intervals using a 256-channel Exploranium™ GR820 spectrometry system with 50.4 L of downward-looking crystals and 8.4 L of upward-looking sodium iodide detectors. The magnetic data were recorded at 10 Hz using a Scintrex™ split-beam line cesium vapour magnetometer, with a sensitivity of 0.01 nT, mounted in a stinger attached to the aircraft. Magnetometer calibration was performed at the GSC Calibration Range in Bourget, Ontario. The maximum tolerance for diurnal variation was 2.0 nT per minute. Flight-path information was recovered using post-flight differential Global Positioning System. Surveying was not completed at the time of writing.

The helicopter-borne survey (Fig 2) was flown with a Eurocopter™ AS350B2 helicopter and consists of 14 780 line km. The traverse line spacing was 420 m, except in the Rail block (Fig 2, area B of the helicopter area) where the line spacing was 210 m and in the Murphy block (Fig 2, area C of the helicopter area) where the line spacing was 250 m. The traverse line orientation was N70°E with control line oriented N165°E. The survey altitude was a nominal mean terrain clearance of 125 m. The magnetometer system was mounted in a stinger attached to the helicopter skids. The spectrometric system had smaller detector volumes than the fixed-wing system with 33.6 L of downward-looking crystals and 4.2 L of upward-looking crystals. Magnetometer calibration was performed at the GSC Calibration Range in Meanook, Alberta. The maximum tolerance for diurnal variation was 2.0 nT per minute. Flight-path information was recovered using a post-flight differential Global Positioning System. Surveying was not completed at the time of writing.

The Regional Geophysics Section and the Radiation Geophysics Section of GSC Central Canada Division performed project management, including quality assurance and quality control, for the survey. The scientific authorities for the surveys performed inspections of the contractors on-site as the survey began. Quality control was performed as the data were acquired. The magnetic data will be tie-line levelled and, once accepted by the scientific authority, will be archived in the Canadian Aeromagnetic Database. The spectrometric data will be processed and compiled by the contractors to the standards of the National Gamma-Ray Spectrometry Program (NATGAM). Measured and computed data include two magnetic parameters (residual total magnetic field and the first vertical derivative of the magnetic field) and eight spectrometric parameters (ternary, total count, K, eU, eTh, and ratios eU/eTh, eU/K, and eTh/K).

RESULTS

The data will be published jointly as GSC Open Files and Geoscience BC Maps by April 1, 2007. The digital profile and gridded data will be made available online and at no cost via the Geoscience Data Repository for Aeromagnetic Data (http://gdr.nrcan.gc.ca/aeromag/index_e.php) and the Geoscience Data Repository for Radioactivity Data (http://gdr.nrcan.gc.ca/gamma/index_e.php). Bitmap images and PDFs of the maps will be available online and at no cost via the Geoscience Data Repository's MIRAGE application (http://gdr.nrcan.gc.ca/mirage/index_e.php). Bitmap images and gridded datasets will also be available on the Government of British Columbia's MapPlace (http://www.em.gov.bc.ca/mining/Geolsurv/MapPlace/).