

Targeting Resources through Exploration and Knowledge (TREK): Geoscience BC's Newest Minerals Project, Interior Plateau Region, South-Central British Columbia (NTS 093B, C, F, G)

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Introduction

Geoscience BC's newest multiyear regional minerals project is called the TREK Project, which stands for **T**argeting **R**esources through **E**xploration and **K**nowledge. The TREK Project is focused on British Columbia's northern Interior Plateau region and covers more than 25 000 km², extending south from Fraser Lake and Vanderhoof to Anahim Lake, and west from Quesnel to the eastern edges of Entiako and Tweedsmuir South provincial parks (Figure 1). The project area includes the active Blackwater gold district and is considered highly prospective for mineral resources. It is characterized by thick overburden and is presently considered to be underexplored due to the difficulties caused by its complicated and poorly understood bedrock geology.

The \$3.9 million in funding for the TREK Project was announced by Geoscience BC in March 2013. First-year TREK activities, undertaken in summer 2013, included an airborne geophysical survey, a regional geochemical survey (stream, lake, soil and till sampling) and local biogeochemical and geothermal sampling programs (Geoscience BC, 2013). Details of the geochemical program are outlined in Sacco et al. (2014). The results of the new geochemical sampling programs will be released in late spring 2014. Details of the geothermal program are presented in Lett and Jackaman (2014).

Geophysical Program

The 2013 TREK geophysical program consisted of a regional aeromagnetic survey and acquisition of proprietary industry data. In May 2013, Geoscience BC issued a public request for proposals for a high-resolution, regional airborne magnetic survey, which was subsequently awarded

to Aeroquest Airborne Ltd. In addition to the acquisition of new regional aeromagnetic data, Geoscience BC purchased high-resolution, proprietary, industry airborne magnetic data from three exploration companies operating within the TREK Project area: Amarc Resources Ltd. (Amarc), Deveron Resources Ltd. (Deveron) and RJK Explorations Ltd. (RJK).

Airborne Magnetic Survey

The regional survey was flown by two Cessna Grand Caravan C208B short take-off and landing (STOL) aircraft (Figure 2). Approximately 104 000 line-km of aeromagnetic data were acquired over a 24 000 km² area from August to November 2013. Flight lines were flown east-west with a 250 m line spacing. North-south tie lines were flown with an average spacing of 2 500 m. A minimum terrain clearance of 100 m was maintained using a preplanned drape surface. The aircraft had three magnetometers and measured both total magnetic intensity and horizontal gradients.

The aeromagnetic system used provides bidirectional horizontal-gradient information using wing-tip magnetometers in addition to a tail-mounted stinger magnetometer. The lateral-gradient measurement reduces the effective line spacing and assists with mapping of small magnetic sources, locating the termination of magnetic sources between lines and identifying small structure-induced offsets in linear magnetic sources. The three magnetic sensors measure total magnetic intensity as well as lateral and longitudinal gradients, allowing a greater understanding of the magnetic structure in the survey area (Aeroquest Airborne Ltd., pers. comm., 2013). This gradiometer system provided resolution of magnetic anomalies equivalent to that of a single-sensor system flown at a line spacing of less than 200 m.

The data acquisition on a preplanned drape surface with STOL aircraft allows the economical collection of high-quality data in steep terrain while maintaining a safe ground clearance and minimizing the effect of differing aircraft flight altitudes going uphill and downhill on adjacent flight lines. Data acquisition on a smooth drape surface also facil-

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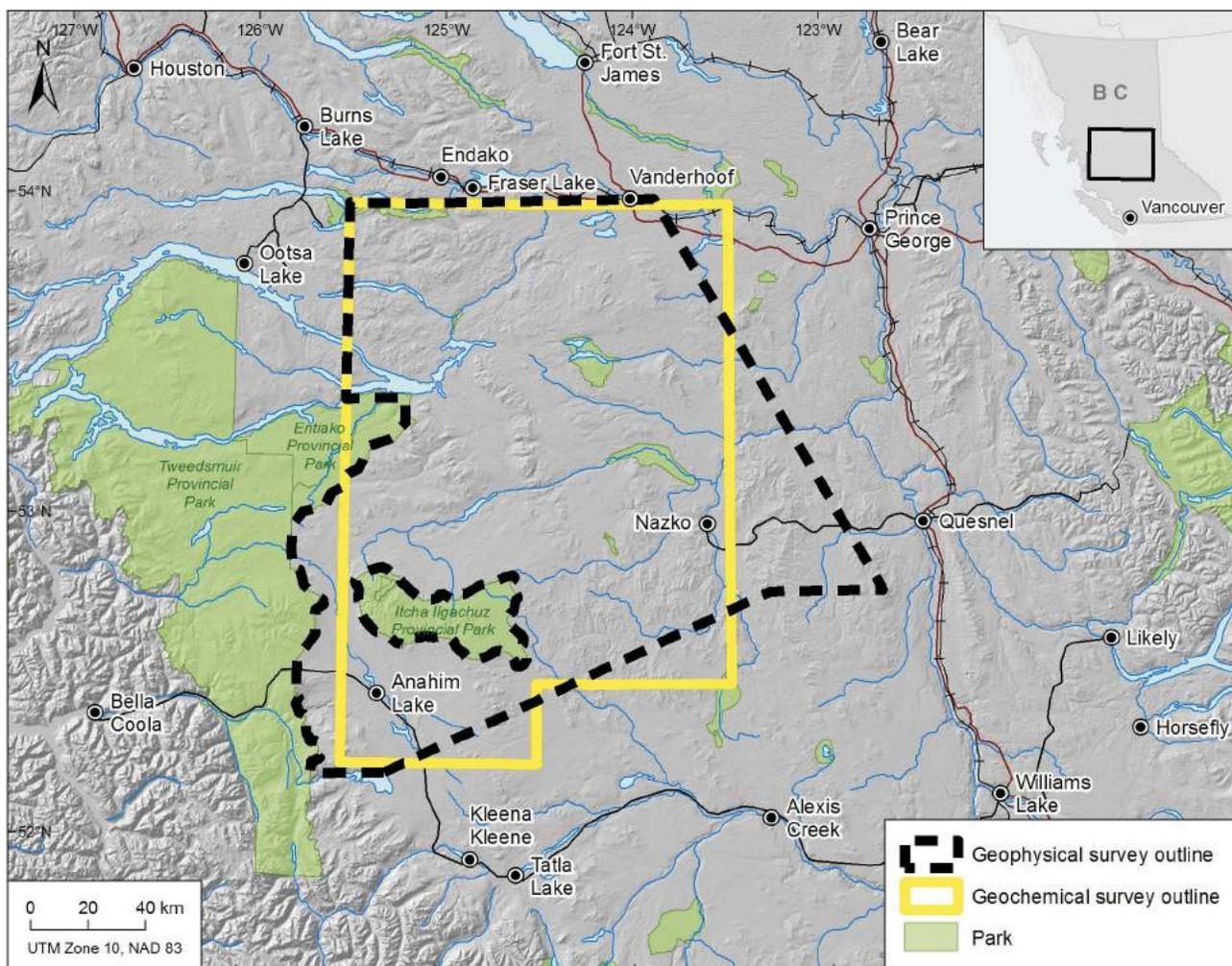


Figure 1. Geoscience BC’s TREK Project area in the Interior Plateau region of central British Columbia, with regional project activities outlined. Data from GeoBase® (2004), Natural Resources Canada (2007) and DataBC (2008).

itates spatial filtering and the calculation of derivative products from the magnetic dataset.

Purchase of Proprietary Industry Data

Simpson et al. (2013) described Geoscience BC’s implementation of a program to purchase proprietary, industry geophysical data, which was modelled after the Ontario Geological Survey’s ‘Request for Data – Purchase of Proprietary Airborne Geophysical Data’. In December 2012, Geoscience BC issued a Request for Expressions of Interest for the sale of proprietary industry airborne magnetic datasets, with the intention of integrating and compiling the data for public release. The request specified that only digital data meeting the following criteria would be considered:

- collected within the Interior Plateau region of BC
- helicopter or fixed-wing airborne magnetics
- collected at a line spacing of 250 m or less
- survey area greater than 200 km² (smaller areas considered under special circumstances)

- survey well documented and supported by logistics reports, flight logs, data-archive descriptions and calibration files



Figure 2. Aeroquest Airborne Ltd. Cessna Caravan C208B used to fly the TREK survey over the Interior Plateau region of south-central British Columbia. Photo courtesy of Aeroquest Airborne Ltd.

- digital data not publicly available, although maps and images already within public domain that had been derived from the data would be considered acceptable

Data Sale Agreements were successfully executed with three exploration companies, all of which have properties within the TREK Project area (Figure 3). Helicopter airborne magnetic data were purchased from each of the three companies. All survey data underwent a thorough technical assessment, after which they were valued based on the following factors: survey method (a higher factor was assigned to helicopter versus fixed-wing acquisition), number of line-kilometres, age (newer survey data are more valuable than older data), and quality and assessment credit (surveys that had never been submitted for assessment were assigned a higher factor).

Airborne magnetic data purchased from Amarc Resources Ltd. were from their Galileo and Hubble properties. The combined area of these two properties was 1340 km², and the acquisition of these data facilitated an increase in the area of the originally planned regional TREK aeromagnetic

survey. The survey purchased from Amarc was flown using a line spacing of 200 m. The Amarc data, collected during electromagnetic (EM) survey work, had a typical sensor height of 49 m, whereas surveys flown using a helicopter-stinger system have a typical sensor height of 103 m.

The aeromagnetic data purchased from both RJK Explorations Ltd. and Deveron Resources Ltd. covered significantly smaller areas than the Amarc surveys. RJK's Blackwater East and West claim blocks together totalled 138 km², and Deveron's Nechako property 137 km². Although the survey areas did not meet all outlined criteria for purchase (i.e., >200 km²), both were close to New Gold's Blackwater Davidson deposit (i.e., an area of high interest) and, for this reason, the data merited procurement. The survey data from both the RJK and Deveron are of high quality, both surveys having been flown at a flight-line spacing of 100 m.

The aeromagnetic data purchased from Amarc, Deveron and RJK will be merged with the regional fixed-wing TREK survey data collected by Aeroquest. Public release of all data is anticipated in early 2014.

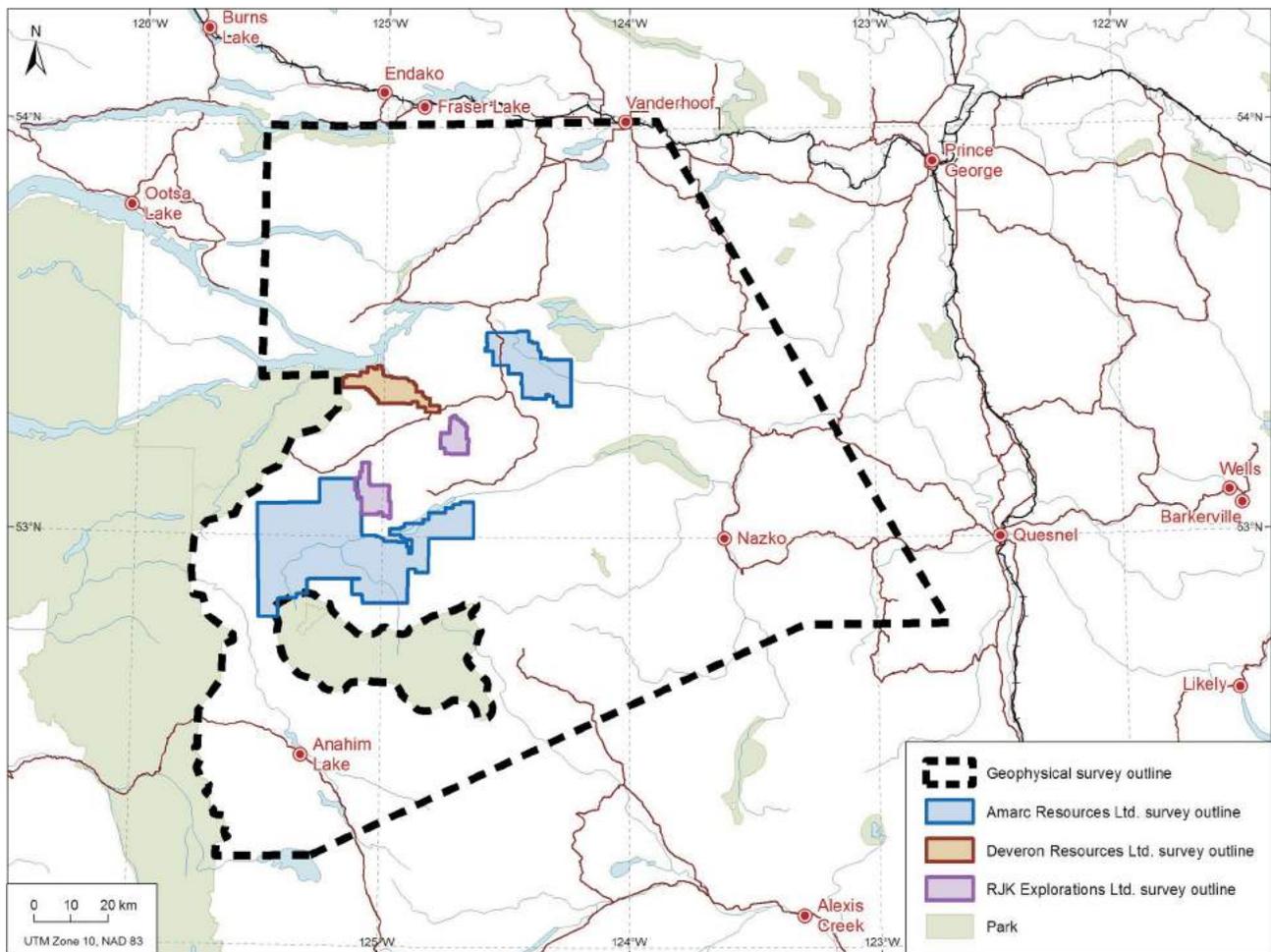


Figure 3. Geoscience BC's TREK airborne geophysical survey area in the Interior Plateau region of central British Columbia, showing the outlines of airborne geophysical survey data purchased from industry. Data from Massey et al. (2005) and DataBC (2008).

Geochemical Program

The first year of the TREK geochemical program was completed during summer 2013 and involved the collection of 684 till samples that will be analyzed for major, minor and trace elements (Sacco et al., 2014). The TREK geochemical sampling program is focused on regions that have not previously been sampled, using basal-till potential maps created in advance of the summer field program. The collection of new samples is expected to take two to three years to complete. The geochemical work is being done by Noble Exploration Services Ltd. in partnership with the BC Geological Survey (BC Ministry of Energy and Mines). In addition to new sampling, Geoscience BC, in co-operation with the BC Geological Survey and the Geological Survey of Canada, has recovered from archive storage approximately 1800 till samples for reanalysis to the same standard as that of the new surveys. Full details of the 2013 geochemical program are outlined in Sacco et al. (2014). Release of the new sampling results is expected in spring 2014.

Geothermal Program

In support of local First Nations' interest in potential geothermal resources, Geoscience BC included a geothermal component as part of the TREK Project. Gas seepages from the soil, travertine deposits and carbon-enriched surface water all occur near the Nazko volcanic cone, together suggesting a magmatic and possibly geothermal source for the phenomena. Lett et al. (2014) describe the geothermal sampling program undertaken during summer 2013. Groundwater, surface water and soil in the Nazko bog and surrounding area were sampled to study the geochemical signature associated with the carbon-dioxide gas seepages.

Geology and Integration Program

The TREK geology and integration program phases will commence after a review of the first year activities. The geochemical and airborne geophysical data will be used to inform the planning of new geological mapping and mineral deposit studies to be conducted by the Mineral Deposit Research Unit at the University of British Columbia.

The geology component of TREK is intended to improve geological understanding of the Interior Plateau region. A series of enhanced geological map products will be produced using new and existing lithological, lithochemical, structural, gravity and age data, and products from Geoscience BC's Nechako Seismic Project (<http://www.geosciencebc.com/s/NechakoSeismic.asp>). The results are expected to generate new geological and thematic maps that will be field tested and updated throughout the life of the TREK Project.

The integration component of TREK will include new TREK data. An updated geological framework for the area

will incorporate the new geophysical and geochemical layers and their integration and subsequent interpretation with available geological information. These products will add value to the regional aeromagnetic and geochemical surveys. A new geology map and various related geological map products, including structural maps, metallogenic maps, geochronological maps, digital databases and GIS layers, are expected products of this program.

Summary

The TREK Project is a multidisciplinary, integrated project located in a region with high potential for new mineral discoveries. The first-year TREK Project activities included the acquisition of new airborne magnetic survey data, completion of the first year of a new two- to three-year geochemical survey, plus geothermal and biogeochemical sampling. Geoscience BC purchased proprietary industry airborne magnetic data within the TREK airborne magnetic survey, adding areas of especially high-resolution information to the project area. These new data, in combination with compilation of past geological mapping efforts, will be used to guide geological studies that will commence in 2014. TREK Project data will be made available on Geoscience BC's website (<http://www.geosciencebc.com/s/TREK.asp>) beginning in early 2014. Results from the project will provide relevant geoscience information to assist mineral exploration efforts in the region.

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