

Search Project: Phase II Activities in West-Central British Columbia (Phases I and II, covering NTS 093E, F, G, K, L, M, N, 103I)

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Introduction

The Search project was conceived by Geoscience BC's Minerals Technical Advisory Committee to generate regional magnetic data and complementary geoscience information for prospective mineral areas of British Columbia (BC). The exploration sector will use this new information to focus or renew its efforts in discovering and developing opportunities within the province. Communities, First Nations and governments will also benefit from new geoscience data that will assist in making informed resource-management decisions and highlighting economic opportunities.

The project name 'Search' was selected as it contains the word 'arch', which refers to the program's initial focus on the Skeena arch: a paleotopographic high that was eroded into the Bowser and Nechako Basins (Tipper and Richards, 1976) and today bridges the span between the Stikine and Quesnel geological terranes. Proximity to infrastructure, modest topography and skilled labour are some of the advantages that make developing projects in this region attractive.

The Search project started with an initial budget of \$2.415 million to fund Phase I and II activities and is planned to be completed in four phases (Figure 1). A primary objective of the project is to complete airborne magnetic surveys with a line spacing of 250 m—creating an opportunity to formulate new geological interpretations at a property-size scale as an aid to explorers. Other Geoscience BC-funded projects making use of similar high-resolution magnetic surveys are the TREK, Northern Vancouver Island, QUEST-Northwest and Jennings River projects. The regional scale of the surveys also supports the development of a refined tectonic framework, especially in areas with poor access or limited rock outcrop such as those identified in the adjoining TREK project area.

Keywords: *British Columbia, Search Project, airborne survey, geophysics, magnetic data, radiometric data, Skeena Arch, Stikine terrane, Quesnel terrane*

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Phases I and II boundaries roughly coincide with the QUEST-West project. This project completed airborne time-domain electromagnetic (TEM) and gravity surveys at a line spacing of 4 and 2 km, respectively, in this region (Kowalczyk, 2009).

Geophysical Program

Phase I field activities were completed in November 2015 and included the helicopter-borne magnetic survey of an area that encompassed the communities of Kitimat, Terrace and Smithers (Madu, 2016). Owing to fall weather in steep mountainous terrain, it was a challenge to complete the project. Results of the 6756 km² survey were released at the Mineral Exploration Roundup 2016 conference in map and digital format through Geoscience BC's website. They were also made available as an interactive map layer on the organization's Earth Science Viewer, a web mapping application that allows a broad client base to immediately access Geoscience BC's data alongside other public information such as current mineral tenures and the BC Geological Survey's geological, MINFILE and ARIS data.

Phase II field activities began in late June 2016, and a contract was awarded to Ottawa-based Sander Geophysics Ltd., who flew an estimated 105 000 line kilometres using fixed-wing aircraft (Figure 2) at a predetermined height and drape over the project area. The survey followed east-west-trending flight lines at 250 m intervals, with north-south tie lines specified at 2500 m intervals. Although not identified as one of its major priorities, radiometric data was also collected in the course of the survey; this task did not interfere with the acquisition of the magnetic data as flights were not altered to optimize conditions for radiometric data collection. Quality assurance and quality control services for the program were provided by in3D Geoscience Inc. and S.E. Geoscience and Exploration. In addition, Hemmera created an ungulate management plan to minimize the program's impact on wildlife in the area. Survey pilots had operating procedures for wildlife observations and were empowered to deviate from planned flight patterns to mitigate negative impacts on animals.

The total flight-line distance flown, including tie lines, was estimated at 116 900 km. This represents an 11% expansion of the originally planned survey coverage owing to the

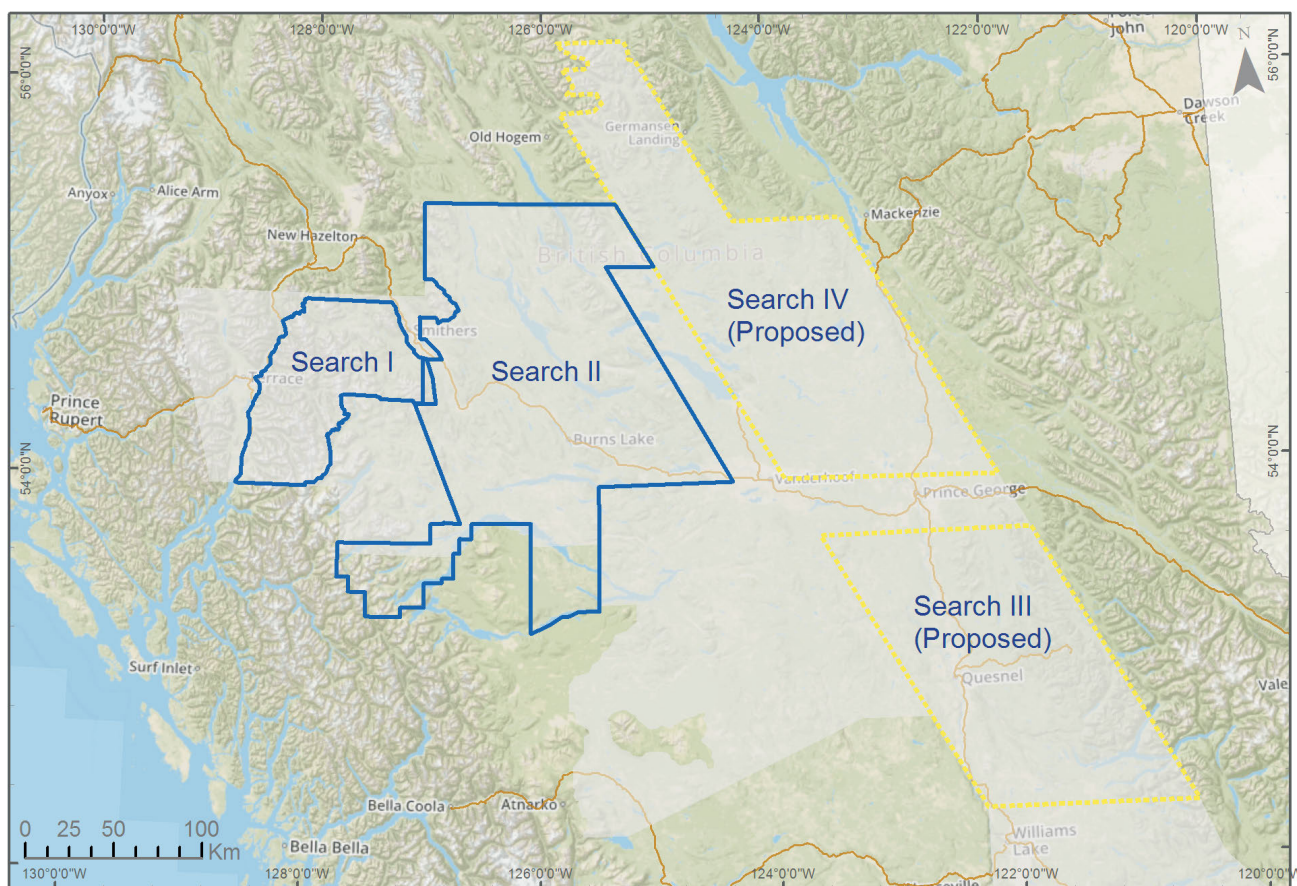


Figure 1. Conceptual location of the four proposed blocks of the Search Project in west-central British Columbia and their phased completion. Planning and consultation processes for upcoming phases are expected to alter ultimate activity areas. Blue outline, Search Phase I and II actual survey area; dashed yellow outlines, coverage of proposed phases of the Search Project; transparent mask, coverage of previous airborne geophysical surveys conducted by Geoscience BC. Background data from Natural Resources Canada (2016).

availability of three aircraft and timely progress during the program; total area covered was 21 122 km² (Figure 3). The 2016 survey connects the area covered in the 2015 Phase I survey to that covered in the 2014 TREK project survey for a combined coverage of 58 737 km².

The TREK project area surrounds the proposed Blackwater gold-silver mine and the results of the Phase II magnetic survey (to be published in January 2017) will provide new regional geophysical data of an area lying just north of this significant deposit. The survey also overflow, or covered areas adjacent to, six active, proposed or closed mines: Morrison, Bell, Granisle, Equity Silver, Endako and Huckleberry (MINFILE 093M 007, 093M 001, 093L 146, 093L 001, 093K 006 and 093E 037, respectively; BC Geological Survey, 2015; Figure 3).

Planning for Phase III activities is expected to commence in late fall 2016, with the goal of continued geophysical surveying in 2017.



Figure 2. The total flight-line distance flown to complete the Phase II airborne geophysical survey in west-central British Columbia was approximately 116 900 km, making it the most extensive of all surveys ever undertaken by Geoscience BC. Phase II was completed using up to three Cessna Grand Caravan aircraft operated by Sander Geophysics Ltd.

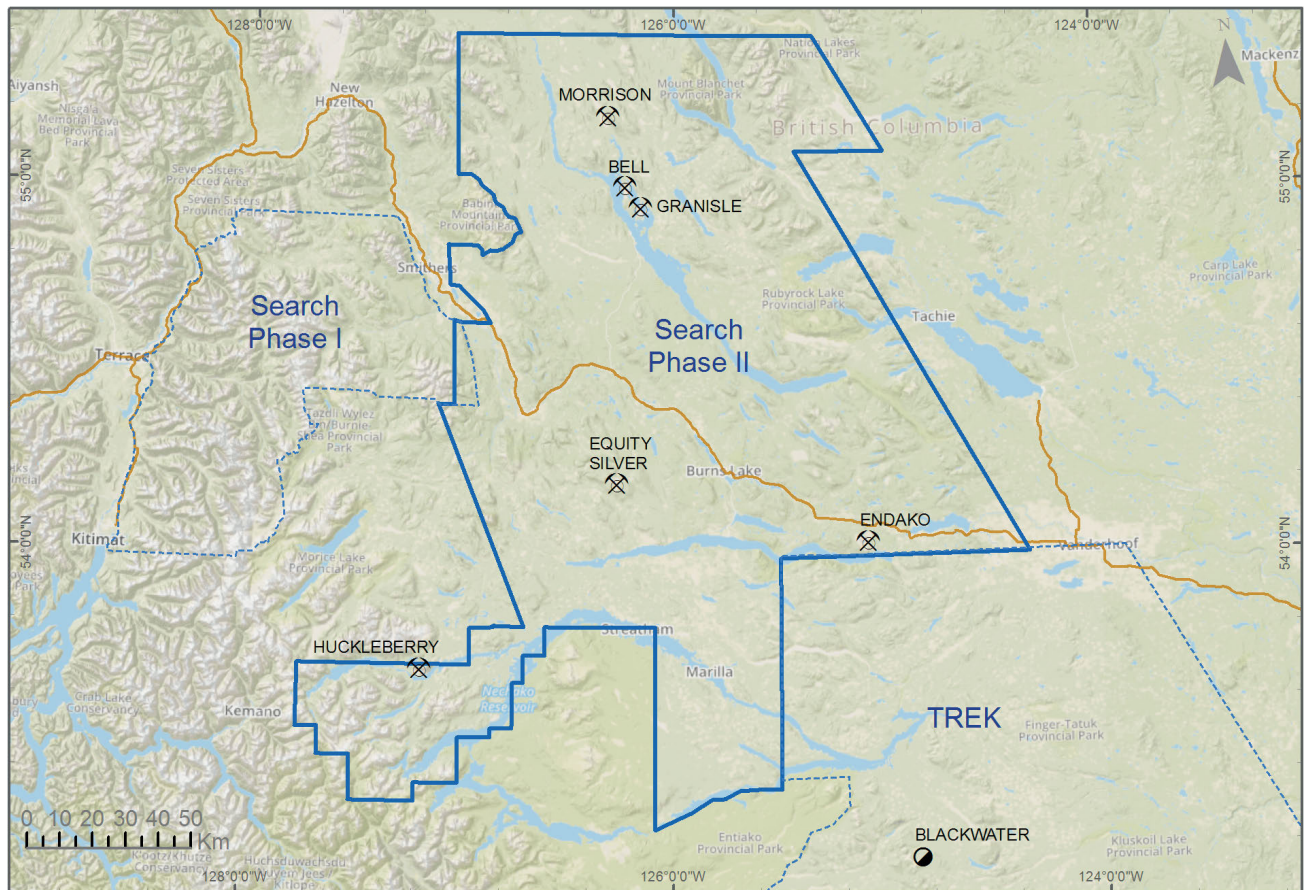


Figure 3. The Phase II airborne geophysical program ultimately surveyed a 21 122 km² area (outlined in blue) in west-central British Columbia in 2016, producing new, high-resolution magnetic and radiometric data. The survey overflow or covered areas adjacent to several active, proposed or closed mines. Background data from Natural Resources Canada (2016) and DataBC (2016).

Geochemical Program

The Search project area has excellent geochemical coverage owing to re-analyses and infill sampling under previous Geoscience BC projects, such as QUEST-West (Jackman et al., 2009). Phases I and II of this program did not include funding for new geochemical-sample collection; however, future proposals may be sought that add value to existing datasets, sponsor innovative techniques or present other original concepts.

Integration Program

A desired outcome when generating new datasets is to integrate them into added-value products that promote new understanding about the geological potential of an area. The Search Project is expected to stimulate renewed interest in an already data-rich region. Recent geological mapping by the BC Geological Survey in the Terrace-Kitimat area (Nelson, 2009) may benefit from new, high-resolution geophysical information and conversely provide better constraints and interpretation of the survey data itself. East of the Terrace area, the Nechako Project of the Geological Survey of Canada's National Geoscience Mapping Program

(NATMAP) produced a comprehensive data library of digital geoscience information (Struik et al., 2007). Geoscience BC strives to ensure explorers benefit from data it collects by releasing it in both raw and interpreted forms, by integrating all relevant data into its Earth Science Viewer web mapping application and by funding projects that add value to the data.

Collaboration between Geoscience BC, the BC Geological Survey and the Mineral Deposit Research Unit of the University of British Columbia led to the development of a field mapping initiative in map areas NTS 093L, 103H and 103I in 2016. The project will enhance the geological dimension of the Search Project by allowing geological components extracted from both the new geophysical survey data and satellite imagery to be validated through ground-truthing methods and targeted field mapping. This region hosts numerous porphyry prospects, a belt of which was the focus of recent exploration activity in map area NTS 093L/13.

Geoscience BC will pursue data integration proposals as the Search Project continues into its third and fourth phases.

Summary

The Search Project is a multiyear project for Geoscience BC that is focused on generating high-resolution regional magnetic-survey data and complementary geoscience data for key prospective mineral areas of the province. In 2016, the program included an airborne survey covering 21 122 km² and targeted geological mapping. Data from the survey will be made available through both Geoscience BC's website and its web mapping application—the Earth Science Viewer.

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This paper benefited from an insightful review by B. Brusche. Numerous prospectors and geoscientists provided input that guided the selection of the survey's ultimate location and ensured it will provide the best-quality new geoscience information needed for their exploration efforts. The communities of Burns Lake and Smithers warmly welcomed the survey crews for the duration of their stay in the region. Several First Nation communities reached out to Geoscience BC to learn more about the program and outreach to all communities in the region is planned during the next phases of the project. Sander Geophysics Ltd. provided excellent service in completing this extensive survey in a professional and efficient manner.

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