# British Columbia's Property File: Project Update and a Case Study of an Integrated MapPlace Analysis of a Target Hidden in the Files

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*KEYWORDS:* Property File, database, mineral occurrence, MINFILE, integrated research, exploration target, MapPlace, QUEST Project, geochemistry, RGS, catchment basins

## INTRODUCTION

The British Columbia Geological Survey (BCGS) is the provincial agency responsible for the mineral resources of the province of BC. As part of its overall mandate, the BCGS has developed the MapPlace website as its primary research and information source. MapPlace comprises numerous integrated databases and applications related to the geology and mineral resources of the province. Property File is one part of this system.

The BCGS Property File is an extensive collection of mineral development documents from throughout the province. Documents within the collection date back to 1852 and are often the only extant copies of the items. The documents have been collected primarily by BCGS staff, but also come from industry donations. Within the files, there is much original information that is not available elsewhere. Until 2009, this information was only accessible in hard copy at the Ministry's library in Victoria. The Property File project was initiated in 2005 to index and make the documents available online. In 2008, the first group of files, comprising approximately 3400 documents, was posted to the web.

Further work on Property File documents in 2009 by Purple Rock Editing, as part of the Geoscience BC QUEST project, added a significant number of documents to the website. During the course of document cataloguing, a number of previously unrecorded mineral occurrences were catalogued and several anomalous locations were identified. This report uses one of the anomalous locations to develop a case study for the use of MapPlace to generate an exploration target based on the Property File information.

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## REVIEW OF THE PROPERTY FILE DATABASE AND APPLICATION

### *History*

It became apparent to BCGS staff that it was difficult to deal with mineral occurrence related information that did not fit with the other, more standardized files/databases like MINFILE or the Assessment Report Indexing System (ARIS). The BCGS staff recognized the relative importance of the information but needed a repository for it. Thus, Property File was born as an adjunct to the Ministry's library. The information was collected and stored on an ad hoc basis and there was no standardization of what was collected. Nonetheless, the information contained was and is still useful. With the advent of MINFILE, the collected documents were generally sorted and stored by MINFILE number with a catch-all designation of a general file associated with each 1:250 000 map sheet. These documents became the classic (or library) collection used extensively by generations of mineral industry clients.

Over the years, as files were added to Property File, two issues became apparent. The first was that this information was located only in Victoria. Industry and other clients had to travel to Victoria to view the materials. Second, over the years, items went missing and thus were lost from the public domain. As many of the documents are now the only extant copies, the BCGS recognized that there needed to be a better way to store and retrieve the files to increase their accessibility and security.

In 2005, the BCGS began designing a web-based system to store, retrieve and display the information contained in Property File. Associated with this was a recognition that the system could leverage off the already powerful and well-used MINFILE database and eventually be integrated into MapPlace. The design and build of the system began in 2007 and the initial roll-out started in 2008. To date there are over 9000 individual documents available online with approximately 20 000 more scanned, indexed and in the process of being added to the database.

The documents are scanned at high resolution and quality checked to ensure all information in the original document is visible in the scanned copy. All documents are then available to the public as Adobe Acrobat® PDFs, which are downloadable free of charge. The scanned documents are available as black and white, greyscale or full colour as dictated by the original. Also, on all maps and map-like documents larger than 11 by 17 in., a digital reference scale has been inserted so that scales can be checked for printing or plotting purposes and for those without included scales, it can be calculated back from reference points on the ground. The scanning contractor developed a unique method to digitally insert the map reference. These

requirements and innovations have increased the utility of the digital documents over their hard-copy originals.

### Sources of Information

The primary sources for the documents are BCGS staff, who collect the items in the course of their work. Other major sources include donations from exploration companies, prospectors and other individuals. Other major inputs have come from companies that closed or downsized exploration offices in BC, such as Falconbridge Limited, Chevron Corporation (Chevron), Cyprus-Anvil Mining Corporation, Placer Dome Inc., Rimfire Minerals Corp. and Inmet Mining Corporation. Other significant collections have come from individuals and include: all the Prospector's Assistance Program reports, 1994–2001; Western Exploration Co. Ltd. (Charles Starr file); Tom Kirk's J & L file; Ken Dawson; Dennis Gorc; and the Cam Stephens family bequest. The total number of documents in Property File in its entirety is estimated at 100 000, with about two-thirds currently having limited to no indexing. The balance is either posted to the web, is ready for posting or is in progress. The BCGS is receiving donations on an ongoing basis and welcomes documents for inclusion in Property File. Information on donations is on the Property File home page at http://www.empr.gov.bc.ca/Mining/Geoscience/PropertyFile/Pages/default.aspx.

### Types of Documents in Property File

Twenty-four types of documents are catalogued in Property File. They include reports, letters, notes, field notes, memos, maps of all kinds, mine plans, securities documents, photos, thin sections and other items. These documents are items in the public domain and are available for general use. Other items in Property File are subject to copyright regulations, including news clippings, theses, excerpts from journals and special publications. Work is progressing on getting the copyright issues solved and having these items posted.

### Property File Search Function

Primary access to the Property File is through the search tool that is available at http:// propertyfile.gov.bc.ca/. All items are coded with MINFILE references and this is probably the most powerful search field (Figure 1). Items that refer to a large area are typically coded by an NTS 1:250 000 map sheet general reference (e.g., 093K GEN), which was specially developed for this project. Author/title indexing, document date, type and collection name can also be used to filter the searches.

The search results page is presented in tabular format and includes the MINFILE number, document title, collection name and the document file size. Clicking on the document title takes the client to the metadata page for the document and includes a link to the PDF document. Clicking on the document file size links the client directly to the PDF document. Clicking on any of the headers sorts the results in ascending order of that header.

### Integration with MINFILE

Property File is also cross-linked with MINFILE. The linking process is ongoing and at the time of writing, several hundred MINFILE occurrences are cross-linked. In those that are linked, the 'EMPR PF' coded reference listings in the MINFILE bibliography are linked to the metadata pages for specific documents in Property File. This works in a similar manner as the ARIS assessment report links in MINFILE.

## CASE STUDY OF HIDDEN TARGETS IN PROPERTY FILE AND INTEGRATION WITH MAPPLACE ANALYSIS

### Roundtop Mountain/Black Stuart Mountain Target, NTS 093A/14

Property File contains a plethora of documents, largely produced by exploration geoscientists. In the course of processing the documents, contract geologists noted that there


**Figure 1.** British Columbia's Property File search page as viewed on the website (http://propertyfile.gov.bc.ca/).

were many projects that were not related to any MINFILE occurrences. Also, some projects were at a reconnaissance level and interesting targets were apparently never followed up. This case study highlights one of these finds and includes an integrated review using MapPlace to evaluate a potential exploration target.

Research by Barlow et al. (2010) as part of the QUEST project examined 2619 documents in Property File that relate to areas within the QUEST and QUEST-West areas. These documents were catalogued, scanned and posted to the Property File website. In the course of the work, numerous regional documents were processed. Upon the examination of the documents during processing, a number of interesting items were identified. One set of these came from the Chevron collection and was part of a regional stream-sediment sampling program called the Cordilleran Sediments Program (Dillon, 1980). Two regions were examined as part of the project: Quesnel Lake–Barkerville and Chetwynd. This project was designed to find base-metal targets with the following elements analyzed: Cu, Pb, Zn, Ag, Au, As, Ba, Fe, Mn, Mo and V. The summary report was prepared by Dillon (1980) and is Property File document number 840311. The reconnaissance geochemical survey in NTS map area 093A/14 is Property File document number 840322 and the detailed follow-up map is Property File document number 840327 (Figure 2).

The initial phase of the Cordilleran Sediments Program sampled a widespread number of creeks in the Barkerville to Quesnel Lake region. Ninety-three sites were sampled in the NTS 093A/14 map area. Initially, samples were collected for heavy-mineral concentrate analysis. From these, several anomalous-element value groups were identified, including two in the Roundtop and Black Stuart mountain areas. Significant anomalous values included >500 ppm Pb, >500 ppm Zn and >3.5 ppm Ag. Maximum values were 2540 ppm Pb, 2080 ppm Zn and 6.2 ppm Ag.

Follow-up sampling focused on adjacent creeks, with 206 additional sites, and the silt-sized fraction of the samples were analyzed (Figure 2). For this aspect of the project, only Cu, Pb, Zn, Ag and Ba were examined. In this case, similar element values were detected. However, significantly higher values were returned from Nolaka Creek, east of Roundtop Mountain; an unnamed creek due west of Black Stuart Mountain; and Kimball Creek, northeast of Black Stuart Mountain. In Nolaka Creek, Pb values ranged from 21 to 113 ppm and Zn values ranged from 63 to 2615 ppm with eight samples at the head of the creek ranging from 525 to 2615 ppm Zn. The highest values for both elements are clustered together at the head of the creek. On Kimball Creek, the detailed sampling revealed a cluster of 14 Zn values with a range from 575 to 3080 ppm. Lead values were elevated slightly above background in the same area. On the unnamed creek, nine samples extending from top to bottom ranged from 530 to 2620 ppm Zn. Five samples, all from the head of the creek adjacent to the peak of Black Stuart Mountain, were in excess of 1500 ppm Zn. Dillon (1980) recognized the significance of the sampling results and commented on it in his report.

## *Integrated MapPlace Analysis*

The following is an example of how MapPlace can provide an analysis to supplement the information contained in Property File. As MapPlace information is spatially defined, the map-based interface can provide a visual superimposition of multiple datasets and increase the utility of individual datasets and applications such as MINFILE, ARIS, Mineral Titles Online, regional geology and base-map data.

Base-map information on MapPlace shows the region is rugged and mountainous. Slopes are steep with generally narrow valleys. There are numerous streams within a net-

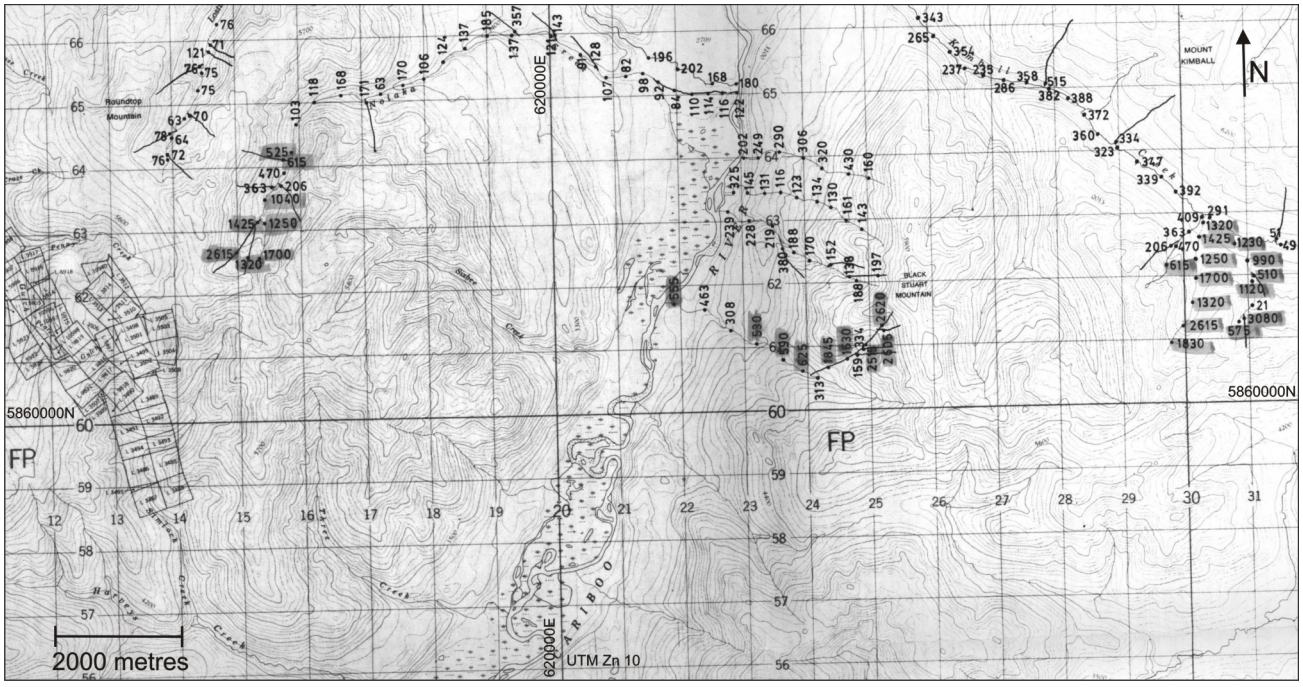


**Figure 2.** Image clip from the detailed follow-up sampling program map by Dillon (1980), Cariboo Lake, British Columbia. The numeric values are Zn concentrations in ppm. Shading of anomalous values reflects the original highlighting on the map.

work of larger creeks and rivers. Major drainage features in the area of interest include the Cariboo River, Cunningham Creek and Kimball Creek. Airphotos show dense tree cover from valley bottom to top, with little alpine exposure. Road access, based on 2007 airphotos, is limited in the area. Roundtop Mountain has relatively good access by roads up along Cunningham Creek on the west and some roads near Nolaka Creek to the east. There is no road access to the Black Stuart Mountain area (Figure 3).

The area of Roundtop and Black Stuart mountains is underlain by rocks of the Cariboo terrane (Struik, 1988). This is a stacked sequence of continental-derived clastic sediments, including shale, grit, sandstone and carbonates, along with minor basalt. The terrane is subdivided into two parts; the first being a Cambrian and older succession and the second being an overlying Ordovician to Permo-Triassic succession. The two successions are separated by an Ordovician unconformity. The lower succession is the Cariboo Group and the upper succession is the Black Stuart Group. At Roundtop Mountain, the Cariboo terrane is thrust westward over oceanic clastic rocks of the Barkerville terrane along the Pleasant Valley thrust.

Correlation of the company's regional and detailed geochemical sampling has yielded some interesting observations. For this analysis, the following MapPlace layers were used in the Exploration Assistant with BCGS geoscience maps: the regional geochemical survey (RGS) 2007 data, with its reworked reports and downloads, and the new Catchment Basins layer. The RGS data has been substantially improved over the years with most of the reanalyzed samples added and integrated into the data. The Catchment Basins layer is new to MapPlace and is derived from provincial drainage basin polygons. The catchment basins are representations of the unique polygon that is the area of influence for each RGS site.

The RGS data shows only subtle variations in the Zn or Pb values within the area of interest. The catchment basin distribution with the associated RGS sample sites shows that the majority of samples taken by Dillon (1980) overlap with the RGS data (Figure 4). East of Roundtop Mountain, the RGS sample shows a Zn value of 106 ppm (RGS sample 93A805134) and the Dillon sample closest to the site had a value of 98 ppm Zn. The Dillon data had values of up to 2615 ppm Zn at the head of the creek. It is interesting to note that the geochemical data indicate relatively short transport distances. Higher values appear to be restricted to 2000–3000 m with a notable drop off outside of the host geological units.

West of Black Stuart Mountain, there are two RGS samples that are in the two drainage areas south of those of the Dillon data. The first sample (RGS sample 93A805111), from a small catchment basin at the foot of the mountain, has a value of 480 ppm Zn. The second sample (RGS sample 93A805110), from a catchment basin that extends up next to the peak, shows only 86 ppm Zn. Two samples collected by Dillon from drainage areas to the north show values of 555 and 239 ppm Zn, going northward.

East of Black Stuart Mountain, there are three RGS sample sites of which two overlap the Dillon data. One RGS sample, number 93A805158, shows 480 ppm Zn, which is an anomalous value in the area as typical Zn values are less than 100 ppm. The only RGS sample that really stands out and closely reflects the Dillon data is RGS sample 93A805156, which has a value of 1260 ppm Zn and compares with a Dillon value of 1320 ppm Zn. This RGS sample location and the cluster of highly anomalous Dillon

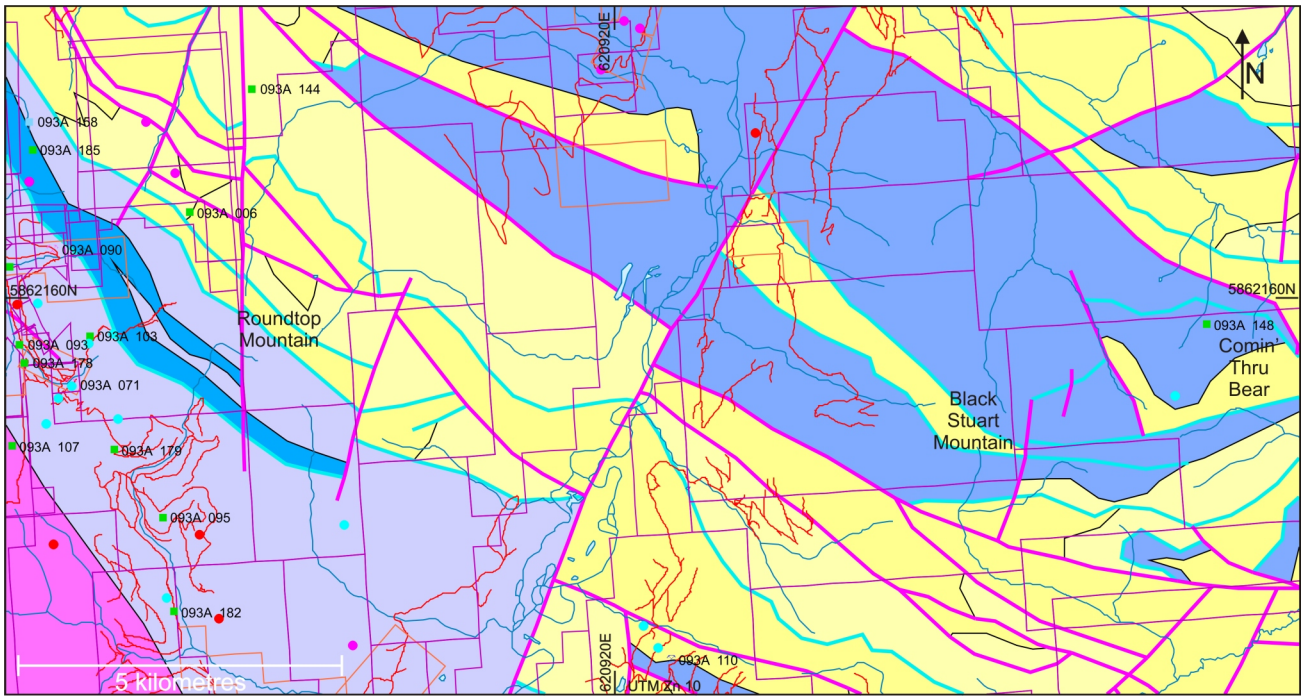


**Figure 3.** Screen capture from the MapPlace Exploration Assistant, showing the area equivalent to Figure 2. Mineral occurrences are coloured squares with the MINFILE number, Assessment Report Indexing System (ARIS) report locations are coloured dots, mineral tenures are outlined in magenta (mineral) and orange (placer). A geology map provides the background layer for the map. The Cariboo Group is shown in shades of yellow and the Black Stuart Group is shown in medium blue (near to Black Stuart Mountain). The purple and two blue units southwest of Roundtop Mountain are parts of the Snowshoe Group and not discussed in this paper.

values is associated with the one known mineral occurrence generated from the original geochemical survey and is discussed below.

Mineral exploration work in the area has largely been focused on placer gold of the Cariboo/Barkerville mining camp and associated hard-rock gold veins. This is shown by the significant number of known metallic mineral occurrences in MINFILE that are located primarily along Cunningham Creek west of Roundtop Mountain and down to the Cariboo River. At the top of Roundtop Mountain, there are two industrial minerals occurrences, one of quartzite and the other of limestone. Between Roundtop and Black Stuart mountains there are no mineral occurrences recorded. This is the area that hosts the stream samples with elevated Zn, Pb and Ag concentrations, according to Dillon (1980).

Mineral assessment reports (housed in the ARIS database) follow the same pattern as the MINFILE occurrences. Reports along Cunningham Creek in the vicinity of Roundtop Mountain range in age from 1976 to 2009. The majority of work has been on both the placer and hard-rock gold occurrences. It is noteworthy that there have been minor amounts of work on Pb-Zn veins/open space fillings and several W showings in the area. Again, however, there has been no recorded work east of Roundtop Mountain. The one exception has been some work on Zn-Pb showings east of Black Stuart Mountain and is associated with some of the results identified by Dillon (1980).

The acquisition of mineral titles has also focused largely on the Cunningham Creek corridor. At the time of writing, most of the ground was staked. Analysis with the Mineral Titles tool in the Exploration Assistant map, however, shows that several large blocks of claims have a common owner and have an anniversary date of early 2010. Other related research indicates that the original staking was part of an area play to the northwest and so the tenure may not be related to local mineralization. Also, when the work by contract geologists originally identified the Property File information above, a significant part of the Roundtop–Black Stuart mountain area was open ground. At the time of writing, this area had been staked. This may be a reflection of the active and dynamic exploration situation in the region.

East of Black Stuart Mountain is a single mineral occurrence that was discovered and developed in association with Dillon's survey work. The occurrence is named the Comin' Thru Bear showing (MINFILE 093A 148). Teck Explorations Ltd. performed a geochemical survey, geological mapping and diamond drilling program on the property in 1981 (Assessment Report 9819; Luvang and Reed, 1981). Lead-zinc mineralization was identified in several locations, which were trenched and subsequently some sites were drilled. Geological mapping by Greenwood (1981) identified the mineralization as diagenetic Pb-Zn mineralization in open spaces within chert-carbonate of the Mural Formation. This stratigraphic designation is inconsistent with the later, revised stratigraphy of Struik (1988) and more closely resembles his chert-carbonate unit assigned to the Black Stuart Group. Mapping, trenching and drilling did not find any economic mineralization but Greenwood (1981) concluded that there was potential for more to be found elsewhere within the Mural Formation.

## SUMMARY OF THE CASE STUDY AND INTEGRATED ANALYSIS

This case study is based on a set of documents from Property File. The information was recognized as signifi-

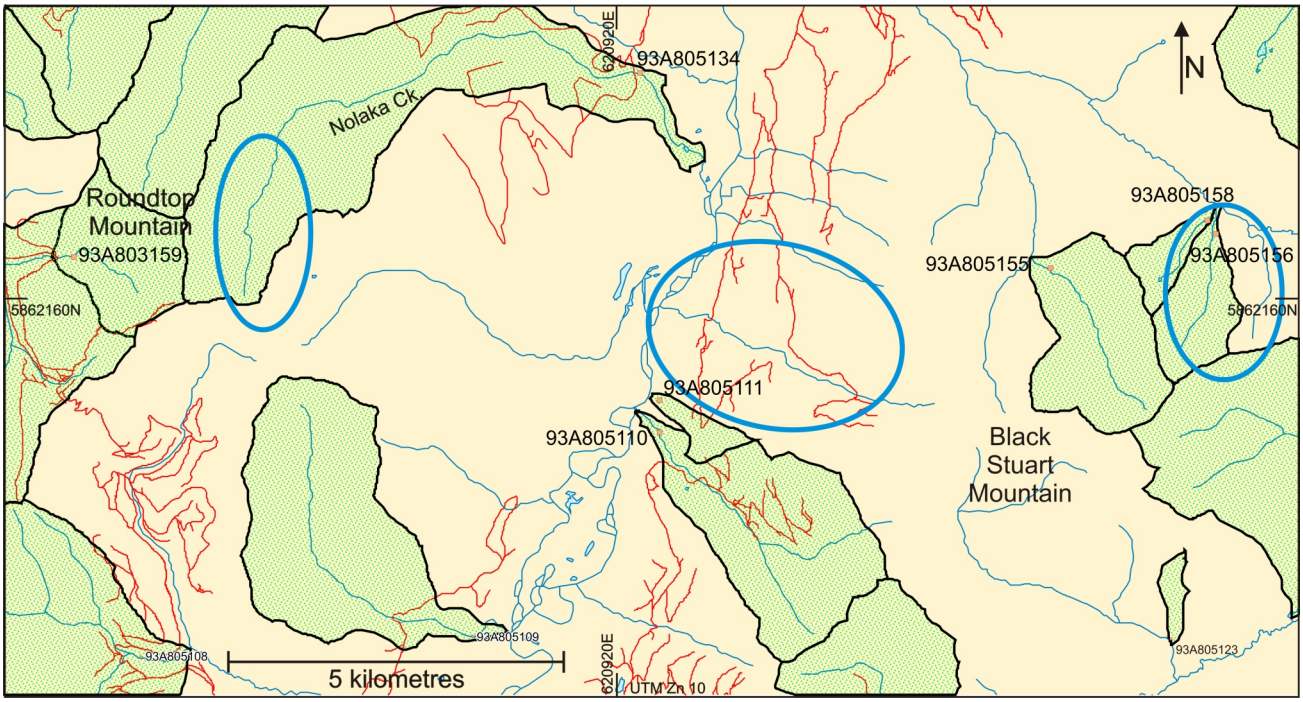


**Figure 4.** Area of interest, Cariboo Lake, British Columbia, with the Catchment Basins in green shading and the RGS sample locations labelled with a Master Identification number. Blue ellipses show the outline of where the anomalous Zn values from Dillon (1980) are grouped. Image outline is the same as the previous maps.

cant but had limited context. By using MapPlace, multiple datasets could be quickly reviewed and examined to evaluate the context of the original document. MapPlace provided access to several specific mineral-related datasets including MINFILE, ARIS, Mineral Titles Online, BCGS geology, airphotos and base mapping. By superimposing the different datasets, a comprehensive review could be developed. As this information is all web-based and free to use, the review could be done anywhere by anyone with Internet access.

The review of the available information allowed known mineralization and its characteristics to be identified. From there, the review identified a general region between Roundtop Mountain and Black Stuart Mountain that hosts prospective geology for Pb-Zn mineralization. The tenure situation in the region is fluid and there exists potential for areas to become free for staking on an ongoing basis. Should that not be the case, either an existing tenure holder or an outside operator could establish a business agreement with the title holder (e.g., a property option) and could follow-up on this kind of research. The ultimate value of Property File information is its record of work, which can provide a basis for future mineral development work.

## ACKNOWLEDGMENTS

The authors wish to recognize the considerable input of work into the Property File project by K. Flower, S. Sweeney, G. Robinson and J. Barlow. L. Groseth of Camirage Imaging Services and J. Weger of Docupointe Services provided high-quality scanning services with often delicate, archival documents. Retired Director of the Resource Information Section, BCGS, G. McArthur provided the initial concept and impetus for the project. The authors thank all the companies and individuals that have contributed material to the Property File. Also, R. Booth, of the BC Ministry of Energy, Mines and Petroleum Resources, Health and Safety Branch, kindly supplied over 3000 scans of mine plans for the database's Mine Plans collection. L. Jones and T. Demchuk provided peer reviews of this paper.

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