

British Columbia Geological Survey Activities in 2010

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INTRODUCTION

The British Columbia Geological Survey (BCGS) continued to play a leading role in the creation of a thriving, safe, and sustainable mining industry in British Columbia (BC) in 2010. This was accomplished by providing world-class geoscience expertise and data to government, industry, and the general public. These diverse groups use our expertise and data in different ways, but an underlying interest of all groups is to see the province position itself as a favoured destination for investment by the mineral exploration and mining industry. A great attribute of the BCGS in the fast-paced world of today is its ability to consistently deliver standardized high quality geological maps, geoscience reports, and online interactive geoscience databases in a very short timeframe. All geoscience products are made available online via MapPlace, the award-winning internet portal of the BCGS.

The mineral exploration and mining industry continued to perform well throughout the 2008-10 recession and helped lead the economic recovery in BC. Exploration expenditures in 2010 are estimated between \$220 and \$300 million, a significant increase over the \$154 million spent in 2009. Nevertheless, funding levels for the BCGS in 2010 were similar to those in 2009. This resulted in the BCGS continuing to focus on creating new geoscience products from existing data and developing innovative programs that involved cooperative partnerships with universities, industry, and other public geoscience agencies. The BCGS continued its long collaboration with the Geological Survey of Canada (GSC) by participating in four joint field projects in 2010. Three field mapping projects were delivered as part of the GSC's Geo-mapping for Energy and Minerals (GEM) program and a new multi-year rare metals project started under the auspices of the renewed Targeted Geoscience Initiative program (TGI-4). This rare metals project is a national initiative co-lead by George Simandl of the BCGS. Its overall objective is to develop new exploration methodologies and technologies in the search for rare metal deposits. Rare metals are important in the manufacturing of automobiles and many high-tech

products such as cell phones and computers. Other important BCGS partners included Geoscience BC (GBC). In 2010, the BCGS and GBC collaborated on the delivery of a surficial mapping and till sampling program southeast of Houston in the Tahtsa Lake district of west-central BC. Finally, as in past years, university students were employed as co-op interns and geoscience assistants throughout the year. Their help with the delivery of our field programs and work on improving our digital geoscience databases is greatly appreciated.

BCGS FIELD ACTIVITIES

A main priority of the BCGS is to generate new geoscience data and products, including bedrock and surficial geology maps and targeted mineral deposit studies. The locations of the 2010 field projects are shown in Figure 1. Projects are typically chosen with the objective of helping to diversify local economies by attracting mineral exploration activity that may lead to the opening of new mines. In many parts of the province, mineral exploration and mining are essential drivers of local employment and tax revenue, and directly support the development of regional infrastructure.

Field mapping studies (Figure 1) continued in the North Coast (Nelson *et al.*, this volume), Iskut River (Mihalynuk *et al.*, this volume), and Tahtsa Lake (Ferbey, this volume) areas of the province. A new two-year GEM "Edges" project in northern British Columbia started in 2010 with mapping in the Kutcho Creek area near the Kutcho Creek volcanogenic massive sulphide deposit (Schiarrizza, this volume).

In addition to these 2010 mapping projects, several other mineral deposit-related studies were brought to completion. These include age determinations of mineralization and porphyritic intrusive rocks at the Brenda and Woodjam porphyry Cu-Mo (Au) deposits (Logan *et al.*, this volume), the creation of a new Mineral Deposit Profile for carbonate-hosted, nonsulphide Zn-Pb deposits in BC (Paradis and Simandl, this volume), a preliminary study of nickeliferous minerals in the Cassiar asbestos deposit (Hora *et al.*, this volume), an investigation of placer gold nuggets with implications for bedrock sources from the Atlin placer camp (Mihalynuk *et al.*, this volume), a study of the mineral potential of the western Liard Basin in northeastern BC (Ferri *et al.*, this volume) and a discussion of the geochemistry of Permo-Triassic volcanic rocks of the southern Nicola Group west

This publication is also available, free of charge, as colour digital files in Adobe Acrobat® PDF format from the BC Ministry of Forests, Mines and Lands website at <http://www.empr.gov.bc.ca/Mining/Geoscience/PublicationsCatalogue/Fieldwork>.

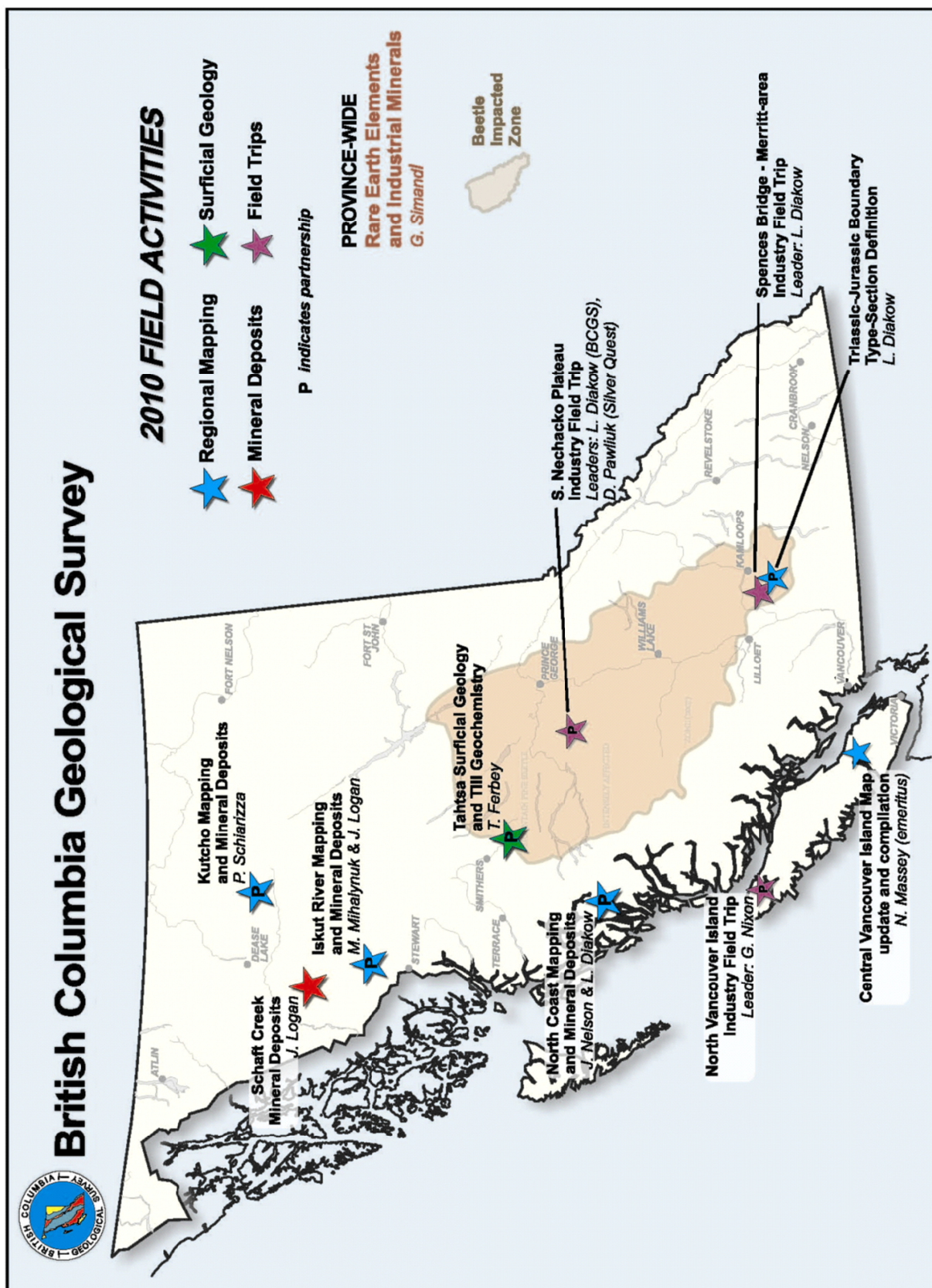


Figure 1. British Columbia Geological Survey 2010 field project areas.

of the Boundary fault near Princeton (Massey, this volume). The western Liard shale basin study is a welcome contribution from the Geoscience and Natural Gas Development Branch of the Ministry of Energy. A technical report by Cui (this volume) on the validation and refitting of stream sample locations in Regional Geochemical Surveys (RGS), together with another paper by Cui (this volume) on the best practices for maintaining geological databases, highlight the importance of data integrity in public geoscience reporting. A technical paper comparing analytical methods for rare earth, rare metal, and high field strength elements in geological samples (Lett and Paterson, this volume) rounds out the contributions (Figure 2).

Several smaller field projects were also completed by Survey staff over the summer. The Schaft Creek porphyry Cu-Mo-Au deposit in northwest BC was visited by Jim Logan and Regional Geologist Paul Wojdak out of the Smithers office (Figure 1). They investigated the various styles of mineralization and types of alteration at Schaft Creek in an effort to draw comparisons and contrasts with other porphyry systems in the province. Larry Diakow visited the Spences Bridge–Merritt area and mapped type sections of the Nicola Group containing conodonts that accurately define the Triassic-Jurassic timescale boundary (Figure 1).

Ongoing Projects

Edges – Modeling the Evolution of the Northern Cordillera Resource Environment from the Edges of Exotic Terranes

Edges is a highly focused multi-year geological mapping initiative involving formal collaboration between the Government of Canada, the Province of British Columbia, the Yukon Territory, Geoscience BC, the United States Geological Survey, and the Alaska Division of Geological and Geophysical Surveys. It began field operations in 2009 in British Columbia and will last



Figure 2. Ray Lett collecting stream samples that contains various pathfinder elements used by exploration geochemists to discover mineral deposits.

until 2013. It is a key project in the Federal GEM program. Support is being contributed by all participating agencies.

The ultimate goal of the initiative is to improve the effectiveness of resource exploration and discovery in the northern Cordillera by outlining resource-rich environments in British Columbia, the Yukon, and Alaska. The geological targets are the exotic outer terranes with their enclosed pre-accretionary syngenetic and epigenetic deposits and the metal-rich Triassic through Paleogene magmatic arcs and associated accretion zones that resulted from interaction of the terranes with the western margin of ancient North America. The target areas include parts of northern and central British Columbia where the geological map base is either several decades out of date or at insufficiently large scale to evaluate mineral potential using modern tectonic interpretations.

North Coast Partnership Project (Edges)

JoAnne Nelson and Larry Diakow returned from a successful second field season mapping along the northern coastal region of BC. In 2009, the first year of the North Coast project, geological mapping began on and near Porcher Island, at the northern end of the Alexander terrane south of Prince Rupert (Figure 1). Mapping in 2010 focused on the southern end of the terrane near Klemtu. In 2011, sparse exposures of pre-plutonic stratified rocks in the intervening region will be documented. JoAnne and Larry's activities were done with help from Brian Mahoney (and his graduate students) from the University of Wisconsin, George Gehrels and Mark Pecha of the University of Arizona, and Cees van Staal from the Geological Survey of Canada. The North Coast project achieved the following in its second year of operation:

- completion of geological map coverage of a 30 by 50 kilometre area covering the channels and islands between Return Channel and northern Princess Royal Island, in eastern Laredo Sound map area.
- rock units of the Alexander terrane of southeastern Alaska can be traced into northwestern British Columbia, including those that are known to host volcanogenic massive sulphide (VMS) mineralization. Farther south, in the 2010 map area, the Alexander terrane is represented by younger, probably Devonian, clastic-carbonate strata.
- the Grenville Channel fault is a mid-Cretaceous sinistral fault of regional extent (>150 km).

Iskut River Partnership Project (Edges)

Mitch Mihalynuk, Jim Logan, and Alex Zagorevski of the GSC returned to the Coast Belt of northwest BC and the area surrounding the Rock and Roll volcanogenic massive sulphide deposit (Figure 3). This was the second



Figure 3. Mitch Mihalyuk using geological intuition to identify areas of high mineral potential in the Iskut.

field season of a partnership between Pacific North West Capital Corp., the University of Victoria, the GSC, and the BCGS. The short-term goal of the project is to determine the stratigraphic and structural setting of the Rock and Roll deposit. The longer term goal is to evaluate the potential for similar mineralization within the Iskut and adjacent regions. Follow up work in 2010 revealed that the stratigraphic sequence, which hosts the Rock and Roll deposit, is similar to that which hosts the Granduc volcanogenic massive sulphide deposit to the south. Mapping in the Hoodoo Mountain area north of Rock and Roll also led to the discovery of numerous copper-gold showings in intrusive rocks that share similarities with the alkalic porphyry Cu-Au style mineralization at the Galore Creek deposit (Figure 4).

Tahtsa Lake Partnership Project

Travis Ferbey, in partnership with Geoscience BC, returned to the Tahtsa Lake district to complete a till geochemistry survey northeast of Huckleberry Mine in the Colleymount map area (NTS 093L/1) that hosts the past producing Equity Silver Mine (Figure 1). This is an area that has high potential to host porphyry Cu⁺/Mo⁺/Au and polymetallic vein occurrences, and possibly volcanogenic massive sulphide deposits. This is the second and final year of the program and builds upon previous Quaternary geology and till geochemistry work



Figure 4. A structurally engaged Jim Logan with Hoodoo Mountain shrouded in clouds in the background.

by Ferbey in 2009. Quaternary till cover presents a challenge to traditional prospecting and makes the area ideally suited for a mineral potential assessment using till geochemistry. During the 2010 field season, 85 basal till samples were collected for analysis. An additional 18 till samples were collected for separation and analysis of heavy mineral concentrates and gold-grain counts.

Observations made at field stations suggest that Quaternary sediments within the study area may not be as thick or areally extensive as previously hypothesized. Therefore, sedimentary cover may not be as significant a hindrance to mineral exploration in the map area.

Southern Nicola Project

Geochemical highlights from Nick Massey on Nicola Group rocks (this volume) follow up on the coordinated mapping projects in 2008 and 2009 by Massey and his colleagues. The present study utilized samples of Nicola Group volcanic and volcanoclastic rocks collected during these years (Figure 5). The results of the geochemical analyses confirm correlation of the Nicola Group rocks west of the Boundary fault with the “Western Belt”. This correlation may have implications for mineralization in the project area. Specifically, felsic volcanic rocks in the “Western Belt” are potential hosts to volcanogenic massive sulphide deposits, although felsic volcanic rocks have not yet been identified in the project area.



Figure 5. Nick Massey examining volcanic rocks of the Nicola Group, Princeton, southern British Columbia.

Major New Projects

Kutcho Partnership Project (Edges)

The Kutcho project is a two-year bedrock mapping program initiated by the BCGS in 2010 in partnership with the Geological Survey of Canada (Edges project) and Kutcho Mining Corp. (formerly Capstone Mining Corporation). The aim of this project is to gain a better understanding of, and provide more detailed geological maps for, the Permo-Triassic Kutcho assemblage, which hosts the Kutcho Creek volcanogenic massive sulphide deposit.

Rare Metals TGI-4 Partnership Project

The BCGS and GSC began collaborating on a multi-year province-wide study of rare metals. The term “rare metals” refers mainly to uncommon, nonferrous metals used in small quantities, typically <150 000 tonnes/year, or derived from geographically restricted areas. The Rare Metals TGI-4 Program will study ore deposits in terms of geological setting, mineralizing processes, applied mineralogy, exploration methods, and metallurgical constraints. The results will address some of the major knowledge gaps related to these deposits and are expected to help the Canadian mining industry tap domestic sources of rare metals. This will contribute directly to supporting the existing and newly developing segments of the high technology industry in North America and help ensure adequate global supply. George Simandl of the BCGS is the national science leader for the Rare Metals TGI-4 Program.

MAPPLACE AND DATABASE ACTIVITIES

MapPlace

MapPlace, our internet portal and one of the most effective geoscience online map systems globally, continues to improve with the addition of new data layers and improved interface tools. MapPlace has provided

clients with efficiencies in research time, data costs and analysis. Data themes and applications available on MapPlace include mineral potential, bedrock and surficial geology, publications, mineral and petroleum tenure, MINFILE, assessment reports, geochemistry and geophysical surveys. Yao Cui and Pat Desjardins contributed geomatic expertise to MapPlace data and application enhancements and integration of servers. MapPlace became active on a new web server in October 2009 and steps are being taken to upgrade maps to MapGuide Enterprise.

New data and updates on MapPlace in 2010 include:

- update to regional geochemistry catchment basins and RGS locations snapped to 1:20 000-scale rivers;
- mineral tenure archives for January 2010 and January 2011;
- Natural Resource Sector Boundaries and First Nations Treaty Areas;
- new BCGS Publication Search Application without imbedded MapPlace map plus Google searches for various parts of the web, databases and reports;
- Mineral Economy map updates with current mines and 2009 exploration properties;
- dynamic update of MINFILE and ARIS with the GeoBC Geographic Warehouse (LRDW);
- Till Geochemistry of the Nadina River Map Area (NTS 093E/15), BCGS Open File 2010-07;
- Relative Drift Thickness Map, North-Central BC, Geoscience BC Report 2010-14;
- QUEST-South Airborne Gravity Survey, Geoscience BC Report 2010-6;
- Regional Drainage Sediment and Water Geochemical Data, Central BC, Geoscience BC Report 2009-11;
- re-analysis of archived stream and lake sediment samples covering NTS map sheets, Sample Reanalysis (NTS 082E, 082L, 082M, 092H, 092I, 092J, 092O, 092P) QUEST-South Project, Geoscience BC Report 2010-4;
- QUEST-South Regional Geochemical Data, in-fill sampling and the reanalysis of archived sediment pulps from NTS map sheets 092H, 092I, 092J, Geoscience BC Report 2010-13;
- Open File 2008-4, Rock Properties table downloads and display;
- additional infrastructure, including airport and port locations, and hydro lines; and
- updated BCGS CGKN Data Catalogue totalling 3900 records.

Property File, Databases, Innovation and Mineral Resource Evaluations

During 2010 Property File, a collection of over 63 000 unique industry documents and maps, continued to grow. Recent Property File donations were made by Andre Panteleyev, Tom Schroeter and the estate of W.G. Hainsworth. As of December, 2010, over 25 000 property file documents were available online, including 403 Falconbridge, 1649 Cyprus-Anvil, 304 Chevron, 476 Placer Dome, 1328 Rimfire, 2969 Mine Plans, 9888 Tom Schroeter project files and 9000 Library items. These are retrieved through a search application or through links from MINFILE, <http://www.propertyfile.gov.bc.ca> and <http://www.minfile.ca>, respectively. Kirk Hancock is the Property File contact. Sarah Meredith-Jones is the MINFILE contact and this year approved update of 171 occurrences and additions of 20 new occurrences.

Users can now access over 30 900 company mineral assessment reports using the ARIS database over the web. Allan Wilcox and Ted Fuller work with clients to approve reports. The mining industry is encouraged to submit assessment reports in digital form to the Mineral Titles Branch. Benefits include higher quality, more efficient digital reports; quicker approval; and lower costs for printing, mailing, storage, scanning and processing. During the year 930 reports were submitted, of which 911 were approved. Of these, 592 or 65% were submitted digitally. The total value of the assessment reports off confidential for 2010 was \$156.6 million. The total reported value of assessment work from January 2008 to December 2010 was \$459.6 million and the number of reports off confidential for same period is 2295. Laura de Groot continues to manage 11 000 web pages and keeps staff on track with database management plans and needs.

Yao Cui continues development of his high-performance algorithm for delineating catchment basins and presenting dynamic spatial data on Google Earth using free and open source tools. A newly released *Geofile 2010-14: QUEST-South Regional Geochemical Survey: catchment basins for 2009 stream samples* and a provincial catchment database for download and MapPlace are results of this work. Yao also created tools to evaluate the positional uncertainty of the Regional Geochemical Survey (RGS) stream sample sites, resulting in a refit of locations from the streams on the original paper-based National Topographic System maps, to their equivalent or matching 1:20 000 scale TRIM streams. The known positional uncertainty and refitted locations on TRIM streams can result in a more meaningful delineation of catchment basins, enhancing the values and advancing the applications of the RGS geochemical results in more detailed geochemical modeling, leveling and mineral prospective mapping. The article, *Regional Geochemical Survey: validation and refitting of stream sample locations*, in this Fieldwork volume provides more details on this project. Yao received the Deputy Minister's Golden Glo Innovation Award for his work in

Delineation of Catchment Basins for Regional Geochemical Survey with High Performance Web Services (Figure 6).

Over the past year Kirk Hancock, Larry Jones and Sarah Meredith-Jones provided 16 mineral resource assessments of different areas of British Columbia for the Ministry of Aboriginal Relations and Reconciliation to assist with treaty negotiations and 3 for other government business. Staff worked with the Mineral Policy and Regional Geology staff developing economic and social assessments and exploration activity products.

BC's Digital Bedrock Geology Map: BCGeology Map

The province's bedrock geology map for industry and government clients is a critical source of information for deciding on areas for exploration and assessing mineral potential. Updating is an important, ongoing task to weave the new data into the digital provincial product, BCGeologyMap. Yao Cui and Pat Desjardins are working with mapping geologists and advanced geospatial technology to improve the efficiency in the maintenance of geological maps. A geology operational database environment (GODE) is being developed to reduce the redundancy in map compilation and data integration while enhancing the data quality. The article, *Improving the Efficiency in the Maintenance of the Provincial Geological Database*, in this Fieldwork volume describes the operational environment and some of the best practices being promoted by the BCGS.

A draft copy of the digital BCGeology Map, updated to include new information from the Bedrock Geology of the QUEST area map, is available for download. This draft, which is the starting point to streamline integration of past and future geological mapping results into the provincial database, is available at:

<http://www.empr.gov.bc.ca/Mining/Geoscience/Bedrock Mapping/Pages/BCGeoMap.aspx>.

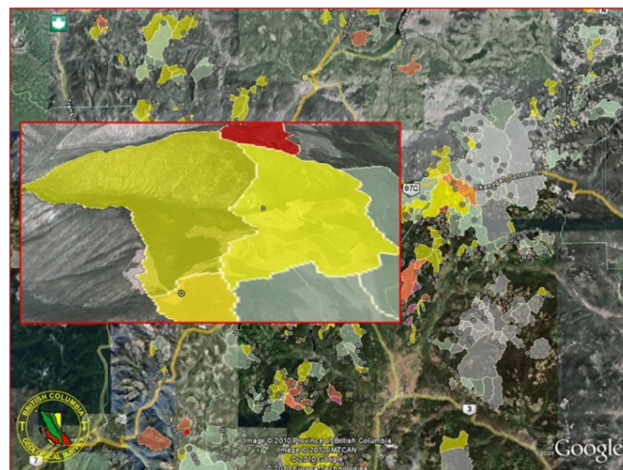


Figure 6. KML data for QUEST South RGS catchment basins.

TECHNICAL MARKETING

BCGS International Workshop on the Geology of Rare Metals

The BCGS hosted almost 200 participants at the International Workshop on the Geology of Rare Metals held in Victoria on November 9th and 10th, 2010 (Figure 7). It was organized by the British Columbia Geological Survey in collaboration with the Geological Survey of Canada and the Pacific Section of the Geological Association of Canada. The Workshop focused on various aspects of rare earth elements (lanthanides, Y and Sc) and other rare metals (mainly Nb, Ta, Li, Be, Zr, Hf). The program consisted of 26 oral presentations, 6 poster displays and an extended abstracts volume that is online on the BCGS website. The Workshop was the first deliverable of the Rare Metals Project that is part of phase four of the Targeted Geoscience Initiative (TGI-4).

Conferences, Workshops and Field Trips

Staff participated in numerous conferences and workshops during 2010, as organizers, speakers and attendees. Highlights from conferences and meetings included:

- presentations by George Simandl and Larry Diakow at the Mineral Exploration Roundup 2010 in Vancouver;
- participation in the Prospectors and Developer's Association of Canada (PDAC) convention in Toronto by hosting a Ministry booth on the trade show floor and helping host an Asian investor luncheon (Figure 8);
- presentations by Larry Diakow and JoAnne Nelson at the 2010 KEG annual meeting in Kamloops;
- Smithers Exploration Group "Rock Talk" presentations by Paul Schiarizza and Travis Ferbey in February. Travis also gave a seminar on regional till geochemistry at a Geoscience BC-sponsored workshop at Rock Talk;
- a workshop on the Life Cycle of a BC Mine presented at Minerals North by Dave Lefebure, and a presentation on regional till surveys by Travis Ferbey;
- a presentation by Steve Rowins at the annual GACMAC conference in Calgary (GeoCanada 2010) on the linkages between porphyry and epithermal deposits in the Toodoggone district. Steve also co-chaired a special technical session on "Hydrothermal Processes in Ore Genesis and Mineral Deposit Discovery" at the conference;
- workshop presentation by Steve Rowins on iron-oxide copper-gold deposits at the BC Geophysical Society's one-day workshop



Figure 7. International Workshop on the Geology of Rare Metals organized by the BCGS in Victoria attracted a sell-out audience.



Figure 8. Jay Fredericks, Larry Jones, and Karina Brino ready to promote British Columbia's mineral resources at the PDAC in Toronto, March 2010.

"Economic Geology for Geophysicists" in May;

- Kirk Hancock presented *Innovations with the BCGS and Publishing Technical Document on the Internet* at the Association of Earth Science Editors in September;
- presentation by Steve Rowins on mid-Tertiary porphyry Cu-Au-Mo deposits in the Cordillera at a Vancouver Island Exploration Group (VIX) meeting in Nanaimo in April;
- Sarah Meredith-Jones presented *New BCGS Data on MapPlace* at Minerals South in November 2010. At the same conference Larry Diakow presented an update on the geology and gold potential of the Nicola and Spences Bridge groups near Merritt.

Staff also shared expertise by leading three field trips in 2010. Graham Nixon kicked off the field season with a two-day field trip for industry and government geologists to Northern Vancouver Island (Figure 9). The participants were treated to a detailed explanation of the evolution of the volcanic sequence and related intrusions and



Figure 9. Graham Nixon expounding on the geology and mineral deposits on northern Vancouver Island to field trip participants.

mineralization. In June, Larry Diakow led a group of industry geologists into the Nechako Plateau region south of Vanderhoof to visit the Blackwater-Davidson and Capoose precious metal properties and see the regional geological setting. In October, Larry led another two-day field trip for BCGS and industry participants to the Merritt area where Nicola and Spences Bridge stratigraphy with related exhalative and epithermal mineralization were examined.

Earthbound Lectures

The BCGS hosts geoscience lectures throughout the year under the banner “Earthbound”. Invited speakers in 2010 included:

- Dec. 17, 2010: Chris Adams, Ministry of Energy, Oil and Gas Division: Exploration and development activity in northeast BC’s shale gas areas.
- Nov. 26, 2010: Kirk Hancock, BCGS: Climate change: A critical review of the data.
- Nov. 12, 2010: Andrew Kerr, Newfoundland & Labrador Geological Survey: Rare-metal renaissance in the Canadian Shield of Labrador: Geological context of active exploration programs.
- Oct. 29, 2010: Alan Galley, GSC: Targeted Geoscience Initiative 4: Increasing exploration effectiveness.
- Oct. 15, 2010: Ray Lett, BCGS Emeritus Scientist: Rare earth element analysis – options & opportunities.
- April 30, 2010: Joanne Nelson, BCGS: Trolling the North Coast for salmon, showings, and schists from Scandinavia.
- April 16, 2010: Duncan McLeish, University of Victoria: Geology of the Aley Creek area, northeastern BC: A record of Mississippian orogenesis in the Cordilleran Foreland Belt?

- March 26, 2010: Bob Anderson, GSC: Some of TGI-3 Cordilleran Project’s ‘Greatest Hits.’ A year five summary of progress.
- March 19, 2010: Steve Rowins, BCGS: The role of Neoproterozoic granitoids in the genesis of the giant Telfer Gold deposit in Western Australia and implications for regional exploration.
- March 5, 2010: Bruce Archibald, Simon Fraser University: McAbee - Climate change and the assembly of the modern world.

Publications

Over the past year, the BCGS published *Geological Fieldwork 2009*, 12 Open File maps and reports, 3 Geoscience Maps, 10 GeoFile maps, reports and data files, and 5 Information Circulars. Various technical papers were also published by staff in external peer-reviewed journals.

With the Regional Geologists as principal authors, the Survey published *Exploration and Mining in British Columbia 2009* and *British Columbia Mines and Mineral Exploration Overview 2009* and coordinated articles on provincial industry activities in the other external publications.

All geoscience publications are available on line at the BCGS website:

<http://www.empr.gov.bc.ca/Mining/Geoscience/>

New BCGS Advisory Subcommittee

The BCGS has always appreciated feedback on its program from clients. In order to generate advice regarding the Survey’s complete geoscience program, committees of client representatives have been used over the years. These representatives are charged with speaking on behalf of their sector while incorporating an understanding of the BCGS government mandate. For example, a Technical Liaison Committee (TLC) composed of mineral industry and university representatives operated from 1984 until 2004.

In 2010, the BCGS was able to start a new Advisory Subcommittee (AS) by working with Geoscience BC to tap four members from their Technical Advisory Committee (TAC) of mineral industry and university representatives. These four members have been joined by another four independent mineral industry representatives to create a balanced AS that reports to the Assistant Deputy Minister of the Mines and Mineral Resources Division of the Ministry of Forests, Mines and Lands (MFML). The AS meets twice a year and consists of Andrew Davies (Chair), Mike Cathro, Steve Cook, Craig Hart, Ward Kilby, Pat McAndless, Dave McClelland, and Jason Weber.

BC MINERAL DEVELOPMENT OFFICE

The role of the BC Mineral Development Office (MDO) in Vancouver is to promote investment in the province's mineral exploration and mining industry, both domestically and internationally. This includes delivering a multifaceted technical campaign to highlight the province's superior coal and mineral potential, renowned geoscience database and expertise, and attractive business climate. The MDO interacts with decision-makers in industry, including executive management, geologists and prospectors, and forms part of the wider marketing efforts of the MFML. The MDO also hosts incoming national and international companies and government representatives, and provides leadership for government trade missions.

Examples of MDO activities in the past year include acting as a key player to profile information on BC's mineral resources, investment procedures and specific mineral commodities to Asian investors, including the Asia Investment Mission to Hong Kong and China, and the Pacific Gateway initiative Mission to Japan in November; preparing articles on BC's mineral resources and exploration and mining activity for numerous ministry and industry publications to promote the province; profiling BC mineral industry investment opportunities at numerous conferences, including the Mineral Exploration Roundup, the Prospectors and Developers Association of Canada (PDAC) convention, the China Mining Conference and the KEG annual meeting; responding on a daily basis to requests for assistance from prospectors, geologists, companies and the public; working on various land-use issues, including those associated with referrals from Mineral Titles; delivering presentations to mining associations in southeast BC and the Community Coal Forum in Chetwynd; and updating publications such as Gold in BC, Copper in BC, and Opportunities to Explore – British Columbia Mining and Minerals.

Marketing Coal and Minerals to Asia-Pacific Region

The MFML continued an active Asia-Pacific marketing strategy to attract direct investment from Asia in BC exploration and mining projects. Asian countries are leading consumers of the province's coal and metal ores, and have a record of investment in BC's minerals industry (Table 1). Key selling points are BC's rich geology, expert geoscience information, interactive online databases, continuing demand for commodities such as copper and coal, a Pacific Rim gateway, modern infrastructure and a skilled workforce. The BCGS provides the MFML with most of the technical expertise and professional delegates for international presentations and meetings with Asian companies. It is the point of contact for incoming international investors through the BC Mineral Development Office in Vancouver.

Regional Geologists

Regional Geologists are a vital component of the MFML's ability to provide detailed geological knowledge of the region in which they live and work, and gather information on industry exploration and mining activity. In late 2010, the regional geologists changed ministries to Natural Resources Operations as part of the reorganization of the natural resource sector of government.

| <u>Regional Geologist</u> | <u>Office</u> | <u>Region</u> |
|---------------------------|---------------|-----------------------------|
| Paul Wojdak | Smithers | Northwest |
| Vacant | Prince George | North-Central and Northeast |
| Bruce Madu | Kamloops | South-Central |
| Dave Grieve | Cranbrook | Southeast |
| Bruce Northcote | Vancouver | Southwest |

The MDO works closely with the regional geologists in attracting investment to BC and in preparing various publications.

STAFF UPDATE

Numerous staff changes occurred in 2010 (Figure 10). Katharine Benning started as the new Administrative Assistant in July filling the position vacated by Arlene Veenhof who left in the same month. Another welcome addition was Ted Fuller. Ted joined the BCGS as a Mineral Assessment Geoscientist in July 2010. Ted, formerly with the Health and Safety Branch, works with Allan Wilcox in assessment report review and providing support for data analysis in the Resource Information Section. Ted's earlier career was as an exploration geologist in BC, Yukon, and other parts of Canada. He also worked with the Geological Survey of Canada and the Canada/Yukon Geoscience Office. Other staff members either moved on or retired. Tania Demchuk, the Manager of Geoscience Marketing and Partnerships, left the Survey in July to start work as an Environmental Geoscientist in the Health and Safety Branch of the Ministry of Natural Resources Operations. Jay Fredericks,



Figure 10. Staff of the British Columbia Geological Survey in 2010.

Table 1. Recent investments from Asia in BC-based companies.

| Year | Asian Company | Country | BC Company | Dollar Amount |
|------|--|----------------|--|-------------------|
| 2000 | Korea Zinc Company | Korea | Teck Cominco | US\$6.1 million |
| 2005 | POSCO | Korea | Elk Valley Corp. | US\$25 million |
| 2005 | Zijin Mining Group | China | Pinnacle Mines | \$1.95 million |
| 2007 | Northwest Non-Ferrous Int'l Investment | China | Yukon Nevada Gold Corp. | \$3 million |
| 2007 | Sojitz | Japan | Thompson Creek Mining | \$100 million |
| 2007 | Chinalco | China | Peru Copper | US\$792 million |
| 2008 | Mitsubishi Materials | Japan | Copper Mountain | \$28.7 million |
| 2008 | Daewon Chemical Co. | Korea | Nanika Resources | \$5 million |
| 2008 | Jingduicheng Molybdenum Group/NWF | China | Yukon Zinc | \$100 million |
| 2008 | Itochu Corp and LG Int'l Investment | Japan Korea | Compliance Clean Energy | US\$11 million |
| 2008 | Kautilan Clean Coal Ltd. | China | Canadian Dehua | US\$5.5 million |
| 2008 | Jilin Jien Nickel Industry Co. - China | China | Goldbrook Ventures Inc. | \$45 million |
| 2009 | Toshiba Corp, Tokyo Electric, Japan Bank | Japan | Uranium One Inc. | US\$221.4 million |
| 2009 | Daewon Chemical Co. Ltd. | Korea | Nanika Resources Inc. | \$5 million |
| 2009 | China Gas Holdings Ltd. (HK) | China | IMW Industries Ltd. | \$20 million |
| 2009 | Tongling Nonferrous Metals Group Holdings Co. Ltd. | China | Canada Zinc Metals Corp. | \$4.9 million |
| 2009 | China Investment Corporation | China | Teck Resources Limited | \$1.74 billion |
| | Minco Gold Corporation | China | Accel China Growth Fund | \$4.44 million |
| 2009 | Korea Zinc Company | Korea | Selwyn Resources Ltd. | \$3 million |
| 2009 | Zijin Mining Group | China | Continental Minerals Corporation | \$25 million |
| 2009 | Yunnan Chihong Zinc & Germanium Co. Ltd. of China | China | Selwyn Resources Ltd. | \$100 million |
| 2009 | Tianjin Huakan Group Co. Ltd. | China | Merit Mining | \$15.5 million |
| 2010 | JOGMEC | Japan | Lomiko Resources | US\$2.5 million |
| 2010 | State Grid International Development Ltd. | China | Quadra Mining Ltd. | \$1 billion |
| 2010 | Jiangxi Copper Company (JCC) | China | BioteQ Environmental Technologies Inc. | \$2 million |
| 2010 | Japanese Consortium (Sojitz Corporation 50%, Dowa Metals & Mining Co., Ltd. 25%, Furukawa Co., Ltd. 25%) | Japan | Taseko Mines Ltd. | \$187 million |
| 2010 | Anthill | China | Yellowhead Mining | \$5.4 million |
| 2010 | Investment in Bingay property | China | Centermount Coal Ltd. | \$6 million |
| 2010 | Huiyong and Kailun companies | China | Canadian Dehua International Mining | \$20 million |

the Director of the Mineral Development Office in Vancouver also left the Survey at the end of the year to work as Vice President for Hathor Exploration Limited.

Andrew Legun, Nick Massey, and Ray Lett all retired in 2010 after long and distinguished careers with the BCGS. Andrew had worked as both a coal geologist and regional mapper, while Nick focused on mapping parts of southern British Columbia, particularly on Vancouver Island. Ray made major contributions to the regional

geochemical data, completed numerous topical studies, and provided laboratory support for the BCGS staff and students. On a positive note, Nick and Ray became the first two Emeritus Scientists with the BCGS. The new Emeritus Scientist program recognizes their tremendous contribution to the Survey and people of British Columbia over the years, and allows for their continued collaboration with Survey personnel on various projects.

NEED MORE INFORMATION? WANT TO COMMENT?

BCGS staff has considerable expertise and welcome the chance to share it. Our contact list is online at: <http://www.empr.gov.bc.ca/Mining/Geoscience/Staff/Pages/default.aspx>.

We always appreciate your input regarding our many programs and activities. Please email us at Geological.Survey@gov.bc.ca or call 250-952-0429.

To learn about new publications, data releases and upcoming events, join the BCGS release notification list by emailing Geological.Survey@gov.bc.ca. Approximately 15-20 emails are sent per year.

