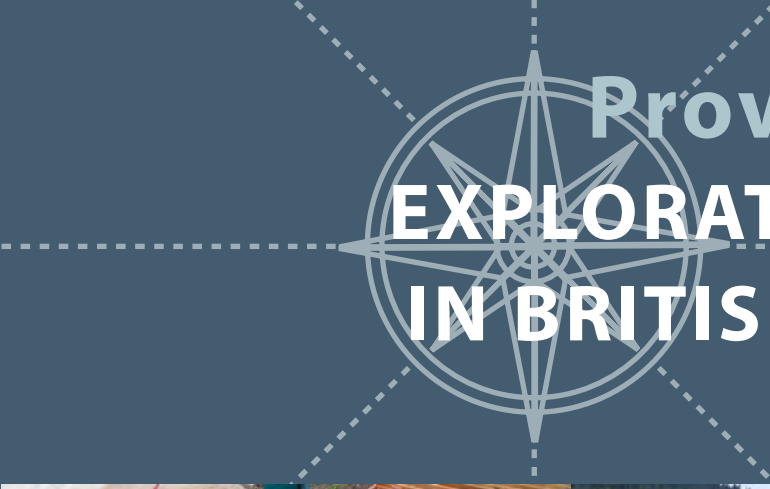




MINISTRY OF ENERGY AND MINES

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Provincial Summary EXPLORATION AND MINING IN BRITISH COLUMBIA 2013



Provincial Summary

Exploration and Mining in British Columbia

2013

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Ministry of Energy and Mines

INTRODUCTION

THE GEOLOGICAL EVOLUTION OF BRITISH COLUMBIA, WHICH SPANS OVER 2.3 BILLION YEARS, HAS ENDOWED THE PROVINCE WITH ABUNDANT MINERAL AND COAL RESOURCES. THE EXPLORATION AND DEVELOPMENT OF THESE RESOURCES IS A CORNERSTONE OF THE PROVINCIAL ECONOMY

With the world's largest concentration of exploration companies and mining professionals, the province is recognized as a leader in raising venture capital and as a centre of excellence in mining related fields.

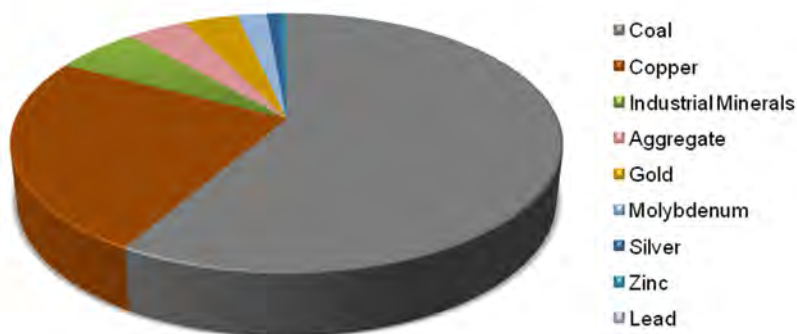
The province's transportation infrastructure provides ready access to world markets, and port, rail, and highway networks are expanding. Attractive industrial electrical power rates play a key role in bringing new mines into production and completion of the 344 km Northwest Transmission Line will provide 287 kilovolt service to key mine development projects.

***British Columbia is
Canada's largest producer
of copper and the only
producer of molybdenum***

The estimated value of mine production for 2013 was \$8.0 billion and includes coal, copper, industrial minerals, aggregate, gold, molybdenum, silver, zinc, and lead output. Nineteen metal and coal mines, 30 industrial mineral mines, and greater than 1000 aggregate mines operated in 2013.

***The value of mine
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estimated at \$8.0 billion***

The provincial Environmental Assessment Office reported 27 mine proposals at year-end. One is under



Coal remains the highest value mine product from British Columbia, comprising roughly sixty percent of the total output and copper represents around twenty-five percent.



Mineral and coal exploration expenditure was estimated at \$476 million for 2013, slipping from \$680 million in 2012. For many companies and projects, a depressed equity market led to reduced exploration.

review and 26 are at the pre-application stage (13 metal or industrial mineral, 11 coal and 3 aggregate). New to the formal environmental assessment process this year are the Arctos Anthracite (coal), Brucejack (gold-silver), Kootenay West (gypsum), and Sukunka (coal) projects.

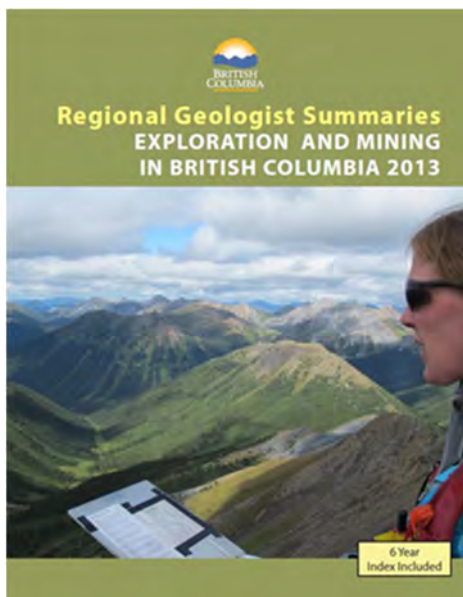
Evaluation and advanced-stage metal and coal exploration projects are estimated at \$476 million for 2013, slipping from \$680 million in 2012. For many companies and projects, a depressed equity market led to reduced exploration.

**Mineral and coal
exploration expenditure
was estimated at \$476
million in 2013**

Copper, Gold and Molybdenum (Porphyry-related)

EIGHT MINES PRODUCE COPPER, GOLD, AND MOLYBDENUM FROM PORPHYRY-RELATED GEOLOGICAL ENVIRONMENTS. COPPER REMAINS THE PROVINCE'S HIGHEST VALUE METAL OUTPUT AND SEVERAL OPERATIONS YIELD SIGNIFICANT CO-PRODUCT GOLD AND MOLYBDENUM

Most producing mines have undertaken modernizations and expansions in recent years as strong metal prices and incentives supported capital investments. For many operations, new mills, expanded pits, and exploration campaigns have spawned new operations and lengthened mine lives well into the future. Growing interest in bulk tonnage underground mining adds new dimensions to exhausted pits and higher grade portions of deposits outside of open pit limits.



The companion document *Regional Geologist Summaries, Exploration and Mining in British Columbia 2013* contains greater detail on the mines or projects in this document and highlights additional ones of regional significance.

Operating Mines and Mine Developments

The largest base metal mine in Canada is the **Highland Valley Copper** copper-molybdenum mine operated by Teck Highland Valley Copper Partnership. Construction is underway on a \$475 million mill optimization project, which is part of a plan to extend mine life to 2026. As one of the province's largest exploration efforts, up to nine drill rigs were active at the Valley and Bethlehem pits on a planned 90 000 metre campaign.

In September, the **Gibraltar** copper-molybdenum mine, operated by Taseko Mines Limited and Cariboo Copper Corp, completed the third phase of a ~\$700 million plan to modernize the mine. The most recent phase included a new 30 000 tonne-per-day mill, a standalone facility that enhances operating flexibility and reliability, and additions to the mining fleet. Mine life has been extended to 2039.

The first full year of operation at New Gold Inc's **New Afton** gold-copper mine, a block cave operation, saw production increased, reserves improved, and head grades rise. Exploration increased resources on trend with the B zone, now being mined, and tripled resources in the C zone, a down-plunge extension of the main reserve.

The **Endako** molybdenum mine of Thompson Creek Metals Company Inc (operator and 75% owner) and Sojitz Corp's (25% owner), faced the challenges of softer metal prices. As a cash saving measure, early mining in the year focused on low-grade stockpiles and six historic dumps. However, by June, mining had resumed in the southwest corner of the Denak West pit and northeast corner of the Endako pit. The new \$650 million mill, commissioned last year, is designed to increase throughput levels and reduce operating costs. It leaves the operation well-positioned to take advantage of a rally in molybdenum prices.

The **Mount Polley** copper-gold-silver mine of Imperial Metals Corporation



A transverse geologic feature known as the Skeena Arch is host to numerous base and precious metals deposits. Production at the Huckleberry copper-gold-silver-molybdenum mine continued to follow the Main Zone Optimization plan while ongoing amalgamation of historic data generated exploration targets.

continued a successful search for resources outside the main producing Springer pit. Exploratory drilling at the Springer pit increased reserves, enabling further expansion of the pit, extended mine life by two years (to 2025) and found ore-grade mineralization hundreds of metres below the current pit shell. Wall pushback continued at the Caribou pit for most of the year and began contributing ore to the mill in the third quarter. Over 500 metres of ramps, cross-cuts, and raises were constructed in the Boundary zone to allow underground drilling and preparation for test mining, while underground drilling also explored the nearby Zuke zone.

Production at Huckleberry Mines Ltd's **Huckleberry** copper-gold-silver-molybdenum mine continued to follow the Main Zone Optimization plan while ongoing amalgamation of historic data generated exploration targets. Current mine life extends to 2021.

The **Copper Mountain** copper-gold mine near Princeton is operated by a partnership of Copper Mountain Mining Corporation and the Mitsubishi Materials Corporation. Mining has met or exceeded guidance figures; a new secondary crusher will be installed to assist milling operations to achieve

their target of 35 000 tonnes per day. A multi-year exploration program seeks to upgrade resources, test ore depths, and find mineralization outside the current mine plan.

Thompson Creek Metals Company Inc stayed on schedule with construction and opening of the approximately \$1.6 billion **Mt. Milligan** copper-gold mine. The mine is a 60 000 tonne-per-day open-pit operation with a permanent operations workforce of up to 450 workers. It has the largest diameter gearless SAG mill on the

The Mt. Milligan copper-gold mine which opened in the fall of this year is the province's newest greenfield mine

continent (40 feet or 12.2 m), the tallest primary crusher in Canada (100 feet or 33.5 m), and a planned zero-discharge site limited to a three by four kilometre footprint.

The phased start-up began with first feed to the concentrator on August 16, 2013. Concentrate began moving to the load-out facility in Mackenzie in late September, and the first ocean

shipment of concentrate (5530 wet tonnes) left Vancouver in November. A dedication ceremony was held on October 8th to recognize the opening of the mine.

Construction at Imperial Metals Corporation's **Red Chris** copper-gold mine peaked this summer and remains on schedule for commissioning by May 2014. The 287 KV Northwest Transmission Line and northern extension destined to bring power to Red Chris were also in full construction.

Mine Evaluation Stage Projects

A revised mine plan for the **New Prosperity** gold-copper project of Taseko Mines Limited was reviewed by a Federal panel this year after an initial design was rejected.

The Red Chris copper-gold mine development reached peak construction this summer and is scheduled to open in early 2014



The Mt. Milligan copper-gold mine is the province's newest greenfield mine having opened in fall of this year. The zero-discharge site is a leading design in the industry and the site boasts numerous accomplishments to be proud of.



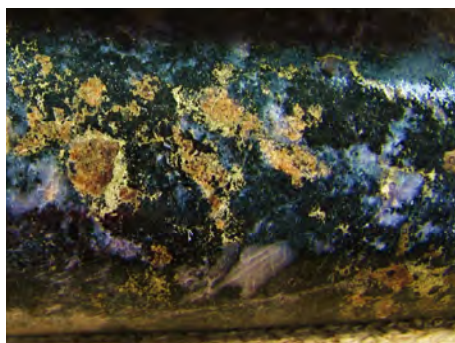
Construction at the Red Chris copper-gold mine peaked this summer and remains on schedule for commissioning by May 2014. The 287 KV Northwest Transmission Line and northern extension destined to bring power to Red Chris were also in full construction.

Late in year, Pacific Booker Minerals Inc's **Morrison** copper-gold project received news that the decision to reject the proposed mine was set aside.

Avanti Mining Corp received an environmental assessment certificate for the past producing **Kitsault** molybdenum-silver mine. The site is already served by a road and power line, and mine construction is anticipated once additional permits and funding are in place.

At Seabridge Gold Inc's **KSM** copper-gold project, an application for an environmental assessment certificate is underway, with a decision due in early 2014. The company drilled the Deep Kerr and Iron Cap zones this year and several intercepts graded significantly higher than current reserves for the project, with a best intercept of 640 metres grading 0.85% copper and 0.42 gram per tonne gold. The project is anticipated to have a 55-year mine life with an estimated capital cost of \$5.3 billion.

Teck Resources Limited bolstered its commitment to exploration and development in northwestern BC by executing a back-in option at the **Schaft Creek** project, after Copper Fox Metals Inc delivered a feasibility study. At the **Galore Creek** project, Galore Creek Mining Corporation (Teck Resources Limited and Novagold



In the Stewart area, several very large copper-gold porphyry projects are under consideration for mine development. At the Galore Creek project a drilling program adjacent to the Central pit defined the Legacy zone – a new zone that may be included in future mine designs.

Resources Inc) completed drilling adjacent to the Central pit and defined the Legacy zone, a new zone that may be included in future mine designs.

KGHM Ajax Mining Inc continued engineering and baseline studies of their **Ajax** copper-gold project in preparation for environmental assessment. The current project layout and design proposes a 60 000 tonne-per-day open-pit mine over part of the Afton mine that closed in the mid-1990s. Public engagement continues to be a high priority for the company, given the project's proximity to the City of Kamloops.

AuRico Gold Inc released a feasibility

study for the **Kemess Underground** copper-gold project that included a 24 650 tonne-per-day block cave operation with a 12-year mine life and using infrastructure from the former Kemess South mine. This project is pursuing a higher grade, deep portion of the Kemess North resource, and follows an operational progression similar to that at the Mt Polley and New Afton mines.

Exploration Stage Projects

Skeena Region. Near the Huckleberry mine, Gold Reach Resources Ltd drilled the Ox and East Seel targets at the **Ootsa** project in search of copper, gold, molybdenum and silver. Some of the best intersections to date were encountered, including 160 metres grading 0.44% copper and 0.53 gram per tonne gold from 30 metres depth and 158 metres grading 0.42% copper and 0.45 gram per tonne gold from 32 metres depth at East Seel. Resource estimates grew substantially during year and are anticipated to be updated again as new results are incorporated. Also in the region, Intrepid Mines Limited drilled the **Itsit** project, and encountered gold values in a search of porphyry-style mineralization. Metal Mountain Resources drilled the **Big Onion** copper-molybdenum deposit in part to confirm historic resources. Riverside Resources Inc used reverse circulation drilling to prospect for porphyry-style mineralization in the Babine Lake area, and made discoveries at the **Flute** and **Lennac** projects.

Colorado Resources Ltd intersected 333 metres of 0.51% copper and 0.67 gram per tonne gold in their discovery drillhole (NR13-001) at the **North ROK** property near the lower Iskut River. Working from the Mabon showing, which was identified by the BC Geological Survey in 1995, Colorado workers identified rock alteration similar to the neighboring Red Chris mine development.

There were several other significant projects in the lower Iskut River region. Oz Minerals Ltd drilled the **ROK** property which is located between Red



Discoveries of new deposits are essential to sustaining the exploration and mining industry. At the exciting North ROK project, rock alteration similar to the neighboring Red Chris mine development was recognized by starting in part at the Mabon showing that was identified by the BC Geological Survey in 1995.

A discovery drillhole at the North ROK project and several other significant projects led to an exciting year in the lower Iskut River region

Chris and North ROK. Freeport-McMoRan Copper & Gold Inc drilled the **Castle** project and undertook early-stage work at the **Tanzilla** and **Pliny** projects, while Amarc Resources Ltd drilled the nearby **Gnat Pass** project. Prosper Gold Corp drilled deeper at the **Sheslay** property than previous efforts and extended copper-gold mineralization to greater depths. Doubleview Capital Corp drilled the nearby **Hat** project while drilling also occurred at the **GJ** project by Teck Resources Limited and at Revolver Resources Inc's **Summit** project.

Northwest of the Sulphurets Camp, Romios Gold Resources Inc reported discovering copper-gold porphyry-style mineralization at its **Newmont Lake** project, and named it Burgundy Ridge. Along a southern and hypothetical extension of the Sulphurets fault, Brigade Resources

Ltd drilled the **Tide-Tennyson** property.

Omineca Region. Serengeti Resources Inc announced a preliminary economic assessment at the **Kwanika** project for a 15 000 tonne-per-day operation with open pits at the Central and South zones and two block cave areas below the Central zone. The mine would produce copper, gold, silver, and molybdenum over a 13.5-year mine life. Analysis of geochemical data identified a deep porphyry target northwest of the Central zone. Other early stage projects including **Osilinka**, **Rottaker**, **SYL**, and **Fleet** were explored.

Canasil Resources Inc drilled a deep hole at **Brenda** in the Toodoggone region, north of the former Kemess mine, to extend the 2007 drilling that ended in gold-copper mineralization. Grassroots programs nearby included an airborne magnetic and radiometric survey at the **Lunar** property of Stratton Resources Inc to follow up anomalous copper and gold identified in late 2012. Copper, silver and gold anomalies were also recently outlined twelve kilometres to the east at the **Frog** property of International Samuel Exploration Corp. Kiska Metals

Exploration interest for copper and gold in the Omineca region remains strong and numerous grassroots projects were active during the year

Corp validated targets and defined geological controls at the **Kliyu** project, where previous drilling intersected copper and gold mineralization.

Manado Gold Corp drilled the **Takla-Rainbow** property to confirm historic drill results and test extensions of the West and East zones, a series of subvertical auriferous quartz veins.

Orestone Mining Corp reported copper and gold intersections in late 2012 drilling at **Captain**. Follow-up ground magnetic surveys outlined nine drill targets, and the Admiral and East Magnetic areas were drilled.

Numerous grassroots programs in the Omineca region included: BC Gold Corp at **Rainbow**; Canasil Resources Inc at **Lil** and **Vega**; Chumar Exploration at **Koko**; Doubleview Capital Corp at **Mt. Milligan North**; Eastfield Resources Ltd at the **Indata**; Far Resources Ltd at **Tchентlo Lake**; Kiska Metals Corp at **Redton**; Pacific Empire Minerals Corp at the **Col-Later**; Rich Rock Resources at **Tas** and **Eagle**; Rift Valley Resources Corp at the **Cat Mountain**; and West Cirque Resources Ltd at **Heath**.

Thompson-Okanagan-Cariboo Region. East of Williams Lake, Gold Fields Horsefly Exploration Corporation released a new resource calculation for the **Woodjam** copper-gold project which now stands at 227.5 million tonnes grading 0.31% copper (inferred) for the Southeast zone.

Happy Creek Minerals Ltd reported good drill intersections from the Ridley Creek zone at the **Fox** tungsten skarn property, northeast of 100 Mile House. At the **Timothy** property east of Lac La Hache, Sunrise Resources Ltd drill tested IP geophysical anomalies and planned an IP survey at their **Diplo** project.

The Cariboo region supports two expanding mines, and successes such as the Woodjam project that has recently grown from discovery to defined resources, demonstrate the potential for more

Princeton copper-gold project adjacent to Copper Mountain Mine.

Tower Resources Ltd completed a first phase of exploration after acquiring the **Rabbit North** copper-gold project, west of the New Afton mine near Kamloops.

Happy Creek Minerals Ltd reported results from a late 2012 drill program at the **Rateria** copper-molybdenum



Mineral exploration occurs at many sites in the province where reducing the environmental impact is important to area communities. The Maggie copper project located north of Cache Creek used zero-discharge drilling techniques and flexibility in site locations after a program of extensive community engagement was completed.

Constantia Resources Ltd drilled the **Maggie** copper project located north of Cache Creek after a program of extensive community engagement that continues with regular updates. Uses of zero-discharge drilling techniques, flexibility in site locations, and other innovations have been employed to minimize the program's environmental impact.

The area between Princeton and Merritt was active. Fjordland Exploration Inc and Sumac Mines Ltd drilled the **Dillard** copper-gold project, and Sunrise Resources Ltd completed a small drill program at the **Man-Prime** property. Sego! Resources Inc used percussion drills to test the Cuba, Upper Regal, and Quintana zones at their **Miner Mountain** copper-gold project. Anglo Canadian Mining Corp drilled the Combination zone of its

property and increased their tenure holdings through staking and an option agreement. The past producing Craigmont mine has been acquired by Huldra Properties Inc, renamed the **Thule** Copper-Iron property, and recommended for a program that includes rehabilitation of underground workings.

Coast Regions. Geoscience BC released geophysical and geochemical results of its Northern Vancouver Island Project in 2013. Junior and major companies followed with staking and initial reconnaissance work. Despite advances in 2011-2012, and a permit for additional drilling, Northisle Copper and Gold chose to put its **North Island** copper-molybdenum-gold project on care and maintenance.

Coal

TEN COAL MINES OPERATE IN THE PROVINCE. MOST PRODUCTION IS METALLURGICAL GRADE (HARD COKING) COAL THAT IS LARGELY EXPORTED TO ASIA WITH LESSER AMOUNTS GOING TO EUROPE AND SOUTH AMERICA

The industry produces coal from four regions: the East Kootenay coalfields; the Peace River coalfield (both contain several mines); the Quinsam operation on Vancouver Island; and the Basin mine in the southern interior. Coal production in the province of all types was estimated at approximately 31.2 million tonnes for the year.

Operating Mines and Mine Developments

Teck Coal Ltd operates five open-pit coal mines in the Elk Valley area of the East Kootenay coalfields. Operations at **Fording River, Greenhills, Line Creek, Elkview, and Coal Mountain** produce approximately 70% of Canada's annual coal exports, directly employ over 4500 people, and support contractors, service companies, suppliers and numerous businesses in the region.

Combined coal production from the southeast region was forecast at approximately 25.3 million tonnes of clean coal for the year, compared to an actual production of 24.1 million tonnes last year. Hard coking coal is the predominant product at four of the five Elk Valley mines, but a range of two or more products is marketed by each of these operations, based on variations in volatile matter and/or ash contents. The Coal Mountain Operation is the exception and

British Columbia is the third largest exporter of seaborne metallurgical coal in the world and produced approximately 31.2 million tonnes of all coal types for the year



Ten coal mines operated in the province producing primarily metallurgical grade coal that is largely exported to Asia with lesser amounts going to Europe and South America. The Line Creek operations in the East Kootenay Coalfields produced 3.4 million tonnes during the year. Conditional approval of the Line Creek Phase II expansion will extend operations for up to 18 years.

produces mainly pulverized coal injection (PCI) coal. In addition to hard coking coal, oxidized coal is marketed as thermal coal from some of the mines.

Teck Coal Limited received conditional approval for the Phase II mine expansion at Line Creek that includes development of the Burnt Ridge North and Mount Michael areas. The expansion will provide approximately 59 million tonnes of clean coal and extend the mine life by an estimated 18 years. At the Elkview mine, an approval for mine expansion at Baldy Ridge which is in their current mining area was received and is subject to

Conditional approval for the Phase II mine expansion at Line Creek operations will extend the mine life by an estimated 18 years

ongoing permit requirements. Greenhills operations are planning to extend operations northward into the Cougar North area, and merge with the adjacent Swift area of the Fording mine. Collectively this is known as the

Swift expansion and is at the pre-application phase of the environmental assessment process.

The year began with four operating open-pit coal mines in the Peace River coalfield of the Northeast Region: the **Trend** mine of Peace River Coal Inc and the **Perry Creek** (Wolverine), **Brule**, and **Willow Creek** mines of Western Coal Corp. Forecast total production in the coalfield for the year was 5.5 million tonnes compared to an actual production of 5.9 million tonnes last year.

In August, permitting was completed and Peace River Coal announced the start of construction at the \$200 million **Roman Expansion Trend** project, two kilometres south of the **Trend** mine. The combined Trend-Roman mine is expected to increase production to 2.5 million tonnes per year by 2016. The company explored the expansion area this year by obtaining geotechnical and structural data on Gething Formation seams, and coal quality data on both Gething and Gates Formation seams.

Production levels at Western Coal Corp's **Perry Creek** mine are expected

Permitting was completed and the start of construction at the \$200 million Roman Expansion Trend project at the Trend Mine was announced

to be on par with last year. On-lease drilling supported current mining in Phase-4A and future mining in 4B. Mine life is expected to continue to about 2019.

Western Coal Corp's Brazion Group of properties is south of Chetwynd and includes the **Brule** and **Willow Creek** mines. Mining is advancing northward from the Camp (South) pit to the Brule (North) pit. Mining north of the Brule pit is anticipated to begin in 3-4 years with a mine life projected to 2023. On-lease exploration is continuing northwest of the mine, where interpretation indicates that tectonic thickening of coal seams may exist. In April, production was curtailed at the Willow Creek mine. The mine produced both HCC and a ULV-PCI product with a higher CSR (Coke Strength after Reaction) which is marketed at a premium price. Once operations resume, mine life is expected to continue another 16 - 20 years.

Teck Coal Limited's **Quintette-Babcock** mine restart, south of Tumbler Ridge, received a permit amendment mid-year for an open-pit operation that is focused on the Windy (Big and Little) and Window pits at Mt Babcock. Engineering work was underway and long-lead time equipment was being procured as part of the \$858 million project, but a final production decision was delayed in July. Resource and geotechnical drilling continued, and a 50 000 tonne clean coal pilot test sample was collected, as the company evaluated options for restart of the mine.

Thermal coal is the primary product at two mines in the province. The **Quinsam** mine near Campbell River produces thermal coal for both local cement plants and the international energy market. The recent development of the 7 South area has

The Quintette-Babcock project received a permit amendment mid-year for a \$858 million restart and awaits a final production decision

allowed the mine to sustain operations at current levels. Mine-site exploration drilling targeted the #3 seam to develop the 4 South and proposed 6 South mines. In June, Coalmont Energy Corporation commenced production at its **Basin** thermal coal mine near Princeton and is working toward a 2014 production target of 350 000 tonnes per year. The wash plant at the mine uses a filter-press method to separate coal from waste eliminating the need for a tailings pond.

Mine Evaluation and Exploration Projects

East Kootenay Coalfields. The **Bingay Main** open-pit and underground coal mine, proposed by Centermount Coal Ltd, entered the environmental assessment process early in the year, but was later suspended. The project is expected to produce 2 million tonnes of coal annually with a total coal resource of approximately 39 million tonnes.



The current coal mine industry largely produces from open pits although several future mines propose underground operations. The Quinsam thermal coal mine uses continuous miners in a room-and-pillar mining method at its Vancouver Island operations.

Jameson Resources Limited drilled the North and South blocks, completed a preliminary economic assessment, and reported a resource estimate of 90 million tonnes for the **Crown Mountain** project. Teck drilled reverse circulation and large diameter reverse flood holes at the **Marten Wheeler** project to evaluate geology for bulk sampling, and also conducted exploration drill programs at each of their operating mines, including: **Cougar Ridge** (Greenhills), **Swift and Henretta** (Fording), **Burnt Ridge North** and **Mt. Michel** (Line Creek), **Baldy Ridge** and **Natal Ridge** (Elkview), and **Coal Mountain**. CanAus completed exploration and sonic core hole drilling at their Loop Ridge, Tent Mountain, and Michel Head properties at their **Michel Creek** project. West of the Coal Mountain mine, Crowsnest Pass Coal Mining Ltd focused at **Coal Creek** on geochemical modelling, coal quality, and resource work.

Peace River Coalfields. At HD Mining International Ltd's **Murray River** project, work resumed in September in preparation for the extraction of a 100 000 tonne bulk sample. The targeted coal seams are at depths between 400-1000 metres. A continuous mining machine arrived on site in support of a proposed underground long-wall mining operation that could produce up to 6

million tonnes per year over a 31-year mine life.

Canadian Kailuan Dehua Mines Co Ltd received a permit for a 100 000 tonne bulk sample at the **Gething** project and plans on taking a 15 000 tonne underground sample employing a room-and-pillar mining method. Site work this year included reclamation activities for previous programs, helicopter-assisted water sampling for baseline studies, and community consultation.

The **Carbon Creek** project of Cardero Resources Corp was approved for a one window provincial environmental assessment under a harmonized provincial and federal review process in April. The company has a prefeasibility study for a combined surface and underground (room-and-pillar) operation with average production of 4.1 million tonnes per year clean coal over an initial 20 years.

Glencore and partner JX Nippon Oil and Energy drilled the **Suska** and **Sukunka** projects in support of a combined surface and underground (long-wall) operation. The mine at Sukunka would initially produce 1.5-2.5 million tonnes per year of hard coking coal from surface mining followed by an underground component that could boost production to 6 million tonnes per year. Capital cost of the project is estimated at \$1800 million. The project is approved for a one window provincial environmental assessment under a harmonized provincial and federal review process.

In May, the **Echo Hill** thermal coal project of Hillsborough Resources Ltd was approved for a harmonized provincial and federal review process and is in the pre-application stage of the process.

Western Coal Corp drilled at **EB** of the Wolverine property group for structural and coal quality information, hydrological assessment, and studied the Perry Creek road which links the EB expansion to the **Perry Creek** wash plant.

Peace River Coal Inc conducted large diameter core drilling at **Roman**

Northwest near its operating mine and later in the year drilled at the contiguous **Waterfall** property. An experimental geophysics program tested different subsurface mapping techniques at both **Roman Mountain** and **Roman Northwest** to develop protocols for regional use.

Canadian Dehua International Mines Group Inc drilled the **Wapiti River** underground prospect for coal quality and subsurface assessment. Colonial Coal International Corp released a preliminary economic assessment study for a combined surface and underground operation at **Huguenot** that would produce an average 3.0 million tonnes per year of clean coal over 31 years. The company completed a data review of the **Flatbed** underground prospect and identified three target areas for exploration. Anglo American Exploration Canada Ltd undertook reconnaissance level work across the coalfield at the **Onion**, **Wolverine North/South** and **Willow South** projects.

Exploration and development work at the **Horizon Ridge** project (formerly the Five Cabin Coal Project) west of the Trend Mine was deferred this year. However it remains in the pre-application stage of the environmental assessment process.

Vancouver Island Coalfields. Early in the year, Compliance Energy Corporation submitted an application for environmental certification of the **Raven** underground coal project. The main product is to be a semi-soft coking coal, with a thermal by-product, at a rate of approximately 830 000 tonnes per year of clean coal over 16 years. The application was determined to have deficiencies and the company expects to submit a revised application in 2014.

Bowser Basin. Fortune Minerals Limited drilled and conducted baseline studies at their **Arctos Anthracite** project in support of an environmental assessment application. Atrium Coal explored their **Groundhog** anthracite project southeast of the Arctos project and a prefeasibility study is anticipated.

Gold and Silver (Veins, Breccias, Disseminated)

Operating Mines and Mine Developments

The **QR** mine of Barkerville Gold Mines Ltd poured doré gold bars early in the year from surface ore mined late in 2012, and underground mining produced 15 000 tonnes of ore that is ready for processing. The mill awaits shipments of new ore from the **Bonanza Ledge** mine which is under development.

Bralorne Gold Mines Ltd milled approximately 80 tonnes per day from stockpiled and underground resources at its **Bralorne** gold mine. The company is targeting quartz veins in relatively undeveloped areas between three former mines (Bralorne, King, and Pioneer) and actively developing the BK-3 zone through drifting and underground drilling. They are also evaluating an expansion of the operation to over 200 tonnes per day.

Sable Resources Ltd placed their seasonal underground **Shasta Mine** and their **Toodoggone Gold/Silver** project on care and maintenance. Ore was previously processed at the 180-200 tonne-per-day Baker mill. Resources are estimated to support about two more years of mining. Additionally, a minimum 130 000 tonnes of historical resources are held nearby at the **Baker** and **Mets** properties.

Mine Evaluation Projects

North of Stewart, Pretium Resources Inc completed a 10 000 tonne underground bulk sample at their high-grade **Brucejack** gold-silver project. Preliminary results yielded 182 421.9 grams gold (5865 ounces) from 10 302 dry tonnes, averaging ~ 17.7 grams per tonne gold, and 153 962 grams silver (4950 ounces) averaging ~ 14.9 grams per tonne silver.

Other major activities at Brucejack included a feasibility study, discovery of the Cleopatra vein, approximately

1.2 kilometres of underground development, completion of 44 601 metres of underground and surface drilling, and commissioning a 75 kilometre site access road from Highway 37. An updated resource estimate for the Valley of the Kings incorporating this year's drill results in addition to results of the bulk sample is expected in early 2014.

On the Nechako Plateau, New Gold Inc completed a feasibility study at the **Blackwater** project for a proposed 60 000 tonne-per-day open-pit operation with a 16-year mine life. Current resources are 295 483 kilograms (9.50 million ounces) gold and 2.18 million kilograms (70.13 million ounces) silver (measured and indicated categories) and would see an annual production of 15 769 kilograms (507 000 ounces) gold and 63 451 kilograms (2.04 million ounces) silver for an initial fifteen years. Similar to the Mt Milligan mine design, benign waste materials from the site would be used to construct a tailings storage facility near the open-pit to minimize the operation's footprint and provide effective water management after closure. Late in the year, New Gold Inc announced that development of the project would be considered in light of the company's Rainy River project in Ontario. The company was active at targets generated by a regional program including the **Capoose**, **Capoose South**, **Van Tine**, **Van Tine South**, **Fawnie**, **Emma**, **Blackwater South/East** and **Auro** projects.

In the Cariboo region, Spanish Mountain Gold Ltd continued resource definition of the **Spanish Mountain** sediment-hosted gold deposit and preparations for an environmental review. A series of reverse circulation holes were drilled in the centre of the deposit to test if the method could yield more accurate grades than diamond drilling.

At the **Elk** gold project, east of Merritt, Gold Mountain Mining Corporation drilled deep IP geophysical targets and advanced pre-feasibility work toward extending the historic pit. The company reported on processing the initial 500 tonnes of a bulk sample:

Gold recovery was high and grades were comparable to both mine site and drillhole estimates.

Sona Resources Corp announced discussions with China Machinery Engineering Corporation toward completing an engineering, procurement, and construction (EPC) contract for the **Blackdome-Elizabeth** underground gold-silver project. Ore would be mined from the Elizabeth project and trucked to the past-producing Blackdome mine for milling, alongside ore from that operation.

One of the province's largest exploration campaigns was at the Brucejack high-grade gold-silver project, and included a bulk sample at the Valley of the Kings and the discovery of the Cleopatra vein

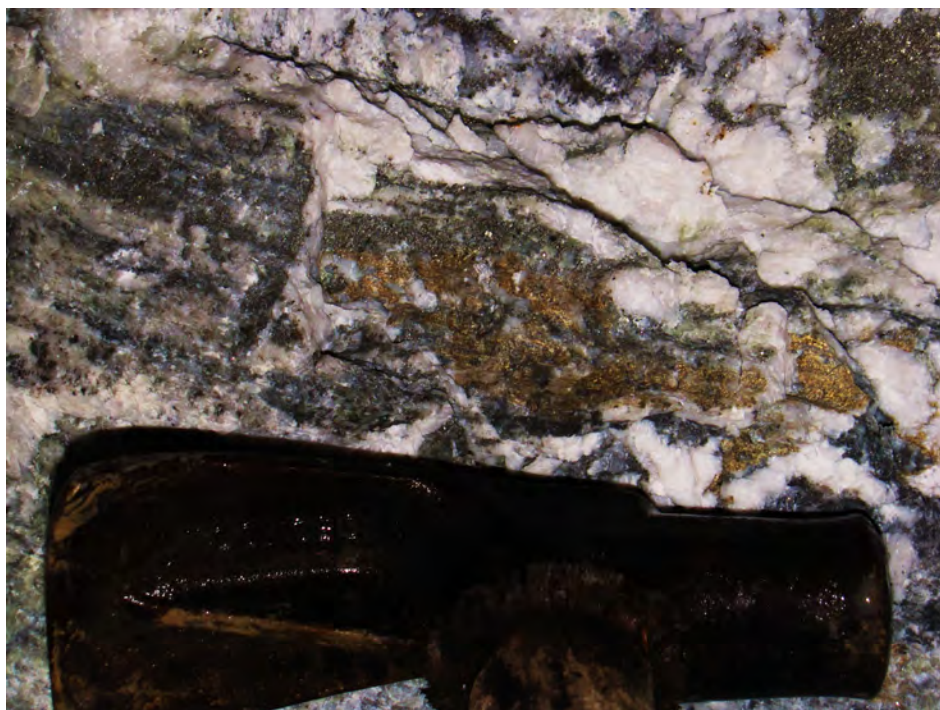
Gavin Mines Inc sought a permit amendment at the **Dome Mountain** gold vein project to allow an onsite mill and thickened tailings storage facility. Underground development is approaching production.

Banks Island Gold Ltd advanced the **Yellow Giant** gold-silver project south of Prince Rupert. Several structural gold targets at the Kim, Tel, Bob, Englishman and Discovery zones were drilled, and underground work proceeded at the Bob zone. A new road network at the property has improved access for exploration and portal locations.

Deer Horn Metals Inc released a preliminary economic assessment for the **Deer Horn** gold-silver-tellurium project based on a 74 000 tonne-per-year mill feed rate.

Exploration Projects

Skeena Region. South of the Brucejack project, Teuton Resources Corp drilled its **High** property, where grab samples have returned high-grade gold values.



One of the year's largest exploration campaigns in the province happened at the high-grade Brucejack gold-silver project and included a processed underground bulk sample, feasibility study and discovery of the Cleopatra vein. Shown here is slickensided gold within a sheared quartz vein stockwork at the Valley of the Kings.

Omineca Region. On the Nechako Plateau, Independence Gold Corp targeted gold and silver at the **3Ts** projects, where they drilled the Ted-Mint gap area, Ted vein, and the Larry and Tommy veins. At the **Big Bear** project, Parlane Resource Corp reported gold-silver-zinc-mineralized drill intercepts at the Black Bear anomaly.

At the **Trout** property, Venerable Ventures Ltd reported on late 2012 drilling and trenching of the Camp zone. At **Blackwater West**, RJK Explorations reported anomalous silver-copper-zinc-lead values in the West Grid 4 target area, and further drilling and IP and magnetic geophysical surveys were completed.

At **Aspen East**, Redhill Resources Corp drilled IP geophysical anomalies, and grassroots work continued on the northern part of the property. At **Key**, Troymet Exploration Corp reported on reverse circulation drilling that tested four target areas and encountered gold-silver, silver-zinc-molybdenum and silver-copper mineralization. Late in the year, New Gold Inc entered an agreement to purchase the property.

In the Toodoggone area, Tower Resources Ltd identified eight

geochemically anomalous target areas at the **JD** gold-silver project. Induced polarization surveying and drilling extended the Finn zone 400 m to the west, and porphyry-style mineralization was discovered a kilometre to the east.

Thompson-Okanagan-Cariboo Region. Barkerville Gold Mines Ltd was active at the Cow Mountain, Island Mountain, and Barkerville Mountain areas of its **Cariboo Gold** project. The company has commissioned an updated technical report to corroborate previous work using infill drill core samples, a comprehensive digital database, and new trench and soil sampling.

In the Chilcotin Plateau Gold Belt, south of the Blackwater project area, Amarc Resources continued to evaluate a bulk tonnage gold discovery at the **Newton** project. Tower Resources Ltd conducted geophysical surveys at its **Baez** gold-silver property to define the scale of the Camp, Clusko and Boulder Ridge South targets. Geoscience BC purchased recent Galileo and Hubble airborne magnetic data from Amarc, extending the TREK dataset west and northwest. The TREK project will deliver updated

geophysical, geochemical, and geological data for 20 000 square kilometres of the Nechako Plateau.

Near Merritt, Westhaven Ventures Inc reported drill results at the **Shovelnose** epithermal gold property.

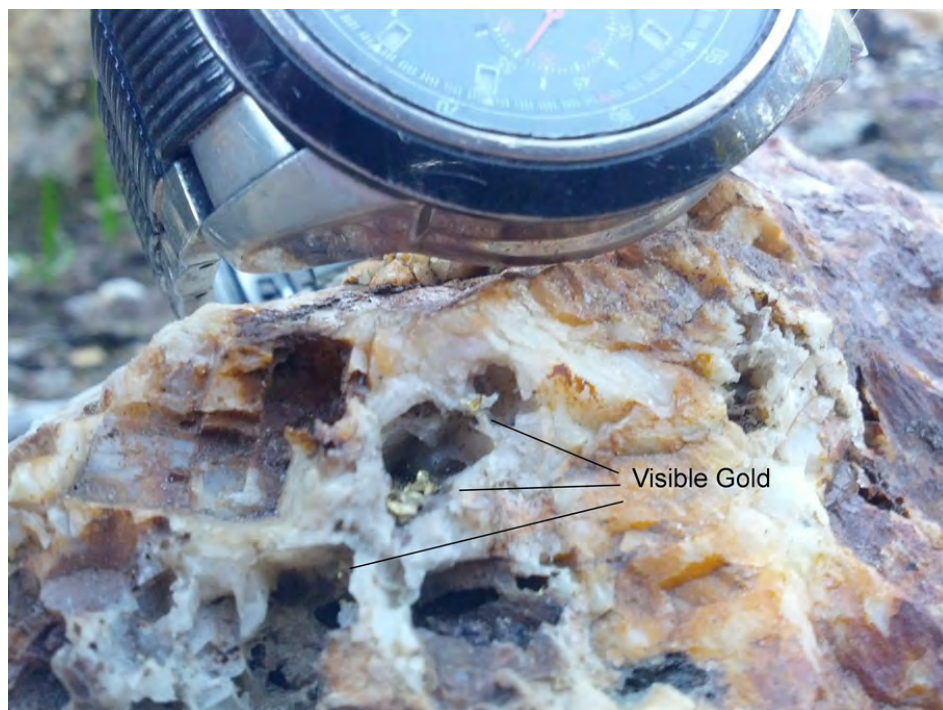
Kootenay Region. Taranis Resources Inc released a resource estimate for their **Thor** property, where exhalative-type sulphide mineralization is a target. Also this year, gold-bearing vein mineralization at the **SIF** zone was a focus.

At the **Greenwood Gold** property, Grizzly Discoveries Ltd reported further geological interpretation and analysis of their extensive drilling between 2008 and 2012. Proximity to Kinross' Buckhorn mine and multiple styles of mineralization make the Greenwood area very prospective for gold exploration.

Near Nelson, Anglo Swiss announced the potential sale of the **Kenville Gold** property to Eagle Creek Gold Corp, and Altair Gold Inc reported recent drill results for the **Kena** property and work on an updated geological model, and Sultan Minerals Inc was active at the **Daylight**.



On the Nechako/Chilcotin Plateau the recent success at the Blackwater project has highlighted the area's mineral potential. At the Aspen East project, drilling targeted induced polarization anomalies while grassroots work continued on the northern part of the property.



In the resource rich Kootenay region, a new resource estimate at the polymetallic Thor property was reported while field activities were focused mainly on a gold-bearing quartz veining system at the SIF zone.

Rainbow Resources was active at their **Big Strike** properties near Slocan City, where recent drilling of mineralized shear-hosted veins intersected gold and silver. The Kimberly Gold Trend near Fort Steele was explored by PJX Resources, with programs at the **Dewdney Trail**, **Zinger** and **Eddy** projects. Klondike Gold Corp completed geophysical surveys at the **Lewis-McNeal** property focusing on

The discovery of the significant Blackwater gold-silver deposit has spurred exploration interest in the Nechako/Chilcotin Plateau

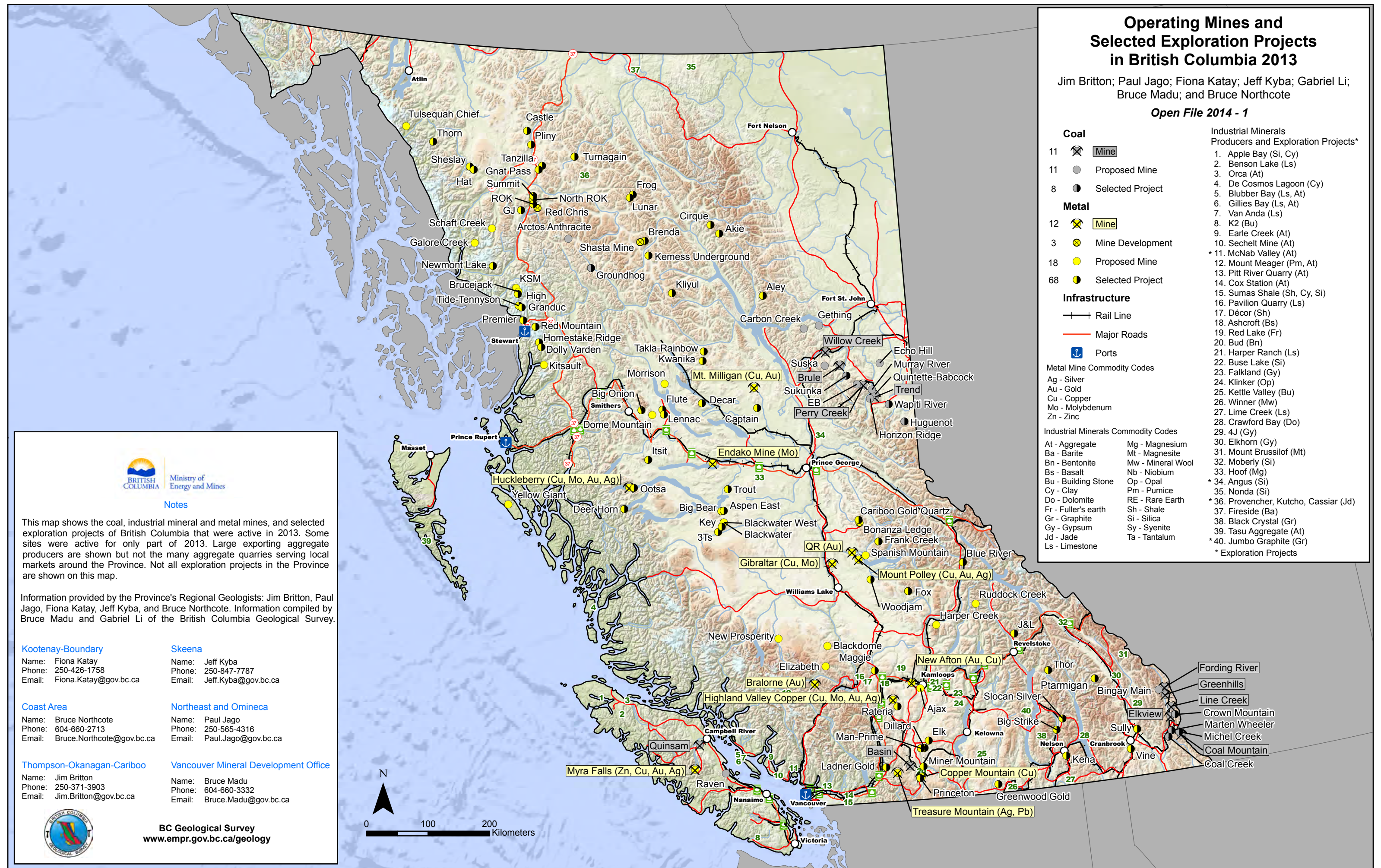
gold-bearing vein systems.

Coast Regions. In the Coquihalla Gold belt of south western BC, New Carolin Gold Corp conducted surface exploration at its **Ladner Gold** project, following a late 2012 drill program. They visited historical mines and showings, compiled recent drill results, and sampled Carolin Mine tailings for metallurgical study. If processing is viable, the tailings would be a potential source of revenue.

Zinc, Copper, Lead, Silver, and Gold (VMS, SEDEX, Stratiform/Stratabound, Veins)

THE PROVINCE'S POLYMETALLIC PRODUCTION COMES FROM A SINGLE OPERATION AT THE MYRA FALLS MINE THAT HAS OPERATED SINCE 1965, HIGHLIGHTING THE ATTRACTIVE NATURE OF THIS DEPOSIT TYPE

The contained metals and deposit types included in this section commonly cover a broad range of projects. Where they include precious metal enrichments they are commonly explored as gold-silver deposits. Silver is more typically a by-product, or potential co-product in the province; however, silver is the primary commodity at several polymetallic prospects. Particular deposits can be auriferous well.



Operating Mines and Mine Developments

On central Vancouver Island, Nyrstar NV's **Myra Falls Operations** saw disruptions to zinc, copper, and lead production during the year, but efforts were taken to maintain previous annual throughputs (~ 500 000 tonnes). As in previous years, exploration programs in 2013 were some of the largest in the South and West Coast regions. Underground exploration drilling sought extensions to mineralized zones and additional VMS lenses. In recent years, exploration and definition drilling has generally replaced reserves at about the same rate they are mined.

Early in the year, Huldra Silver Inc commenced production at its **Treasure Mountain** mine, a high-grade silver-lead vein in the upper Tulameen watershed. Milling at a 200 tonne-per-day mill was completed near Merritt. In June, both operations were placed on care and maintenance.

Mine Evaluation Projects

Chieftain Metals Corp released a feasibility study and received final permits for developing the **Tulsequah**

Chief polymetallic project in the very northwestern part of the Skeena region. The company explored new targets in the Tulsequah Chief, Big Bull, and Banker/Sparling areas.

Yellowhead Mining Inc applied for an environmental assessment of the **Harper Creek** copper-gold-silver project north of Kamloops. The company released an amended feasibility study and drill results from late 2012 that confirmed deposit continuity and grade. Public engagement included progress on memoranda of understanding with area First Nations.

The **Ruddock Creek** underground zinc-lead project of Ruddock Creek Mining Corporation is in the pre-application stage of the environmental assessment process. Activities this year focused on the environmental, geological, and engineering aspects of the project, and community engagement.

Exploration Projects

Skeena Region. Brixton Metals Corporation reported drill results from the Oban zone at the **Thorn** project, where targets are high-grade silver-gold-lead-zinc diatreme-breccia zones and high-grade gold-silver-

copper veins.

Ascot Resources Ltd reported more auriferous drill results from the **Premier** gold-silver project and a new resource estimate for the Big Missouri and Martha Ellen zones, and Banks Island Gold Corp drilled the **Red Mountain** property.

Agnico Eagle Mines Limited completed their first exploration season as operator of the **Homestake Ridge** gold-silver-copper project, and discovered the Slide zone where a drillhole intersected 18.6 metres of 101.8 grams per tonne silver from 364.4 metres depth. Dolly Varden Silver Corporation drilled the past producing **Dolly Varden** silver project in search of a silver-rich variety of an Eskay Creek-style rift deposit.

Castle Resources Inc released a preliminary economic assessment for their **Granduc** copper-gold-silver

Polymetallic deposits containing base metals were explored for widely across the province, and ones with elevated precious metals continued to attract significant attention as well



The province's producing polymetallic mine is the Myra Falls operation on Vancouver Island. With limited surface availability, mining equipment is assembled and maintained in underground workshops such as this.

massive sulphide deposit, outlining an 8500 tonne-per-day underground mine with a 15-year mine life and a cost of \$494 million.

Omineca Region. In the Kechika Trough, Canada Zinc Metals Corp is exploring a 135 kilometre long belt that is prospective for SEDEX deposits. This year they expanded a recent airborne VTEM survey to include the remaining **Kechika Regional** properties and hydrogeochemical work continued at **Kwad** and **Weiss**. Drilling at **Akie** tested four targets and exploration at **Mt Alcock** and **Akie** discovered the Sitka showing.

Teck Resources Limited re-established the **Cirque** camp and drilled deep targets at North and South Cirque. Additional exploration was completed

at the **Cirque**, **Fluke** and **Elf** and newly optioned **Pie**, **Cirque East** and **Yuen** properties.

Thompson-Okanagan-Cariboo Region. The Adams Plateau area, east of Barriere, saw renewed interest after several quiet years, stimulated in part by the advancing Harper Creek project. Newport Exploration Ltd acquired the **Chu Chua** massive sulphide deposit and started metallurgical testing. Nearby, First Americas Gold Corporation reported successful use of Ah horizon soil geochemistry and novel VLF inversion techniques to search for massive sulphide mineralization at their **Kamloops Copper-Gold** property. Astral Mining Corporation optioned the **Barrier Ridge** and **Honeymoon** projects, and Victory Ventures Inc optioned the **Fortuna** claims.

Barker Minerals Ltd trenched and drilled short holes on geophysical conductors on the **Frank Creek** lead-zinc property in the Cariboo.

Kootenay Region. In the East Kootenays, exploration for Sullivan-type mineralization and related polymetallic vein systems continued. Near Fort Steele, Santa Fe Metals Corp drilled a deep gravity anomaly at the **Sully** property in rocks of a geological horizon specific to the Sullivan deposit: Sullivan-time. The program used enhanced drill stabilization techniques to reach depths of over 1100 metres; deviation was an issue and the intended target went untested. Nearby, MMG Limited explored the **Findlay** property, while east of Kimberly, Bluefire Resources



The Kechika Trough in the northeastern part of the province hosts a 135 kilometre long prospective belt for SEDEX deposits. Significant programs were undertaken by Canada Zinc Metals Corp and Teck.

Ltd worked the **K9** property following up anomalies identified by a regional TEM geophysical survey.

PJX Resources Inc drilled a single drillhole at the **Vine** property, pursuing bedded massive sulphide mineralization encountered in two historic drillholes and a geophysical anomaly.

Silver Mountain Mines Inc drilled late in the year at the **Ptarmigan** property near Radium, where they identified new mineralization and zone extensions for silver-bearing veins and manto-style mineralization.

Several early stage projects were active this year in the Kootenay region. Drill results were reported at Emgold Mining Corp's **Stewart and Rozan** projects and also at International Bethlehem's **LH** project. Silver Phoenix Resources Inc completed a program at the **Waverly-Tangier** project, as did

Ongoing interest was seen in the Kechika Trough which hosts a geological belt that is prospective for SEDEX deposits

Agave Silver at its **Kaslo Silver** project. Klondike Gold Corp was active at their **Hughes Range** project, which contains the past producing Kootenay King Mine.

Discovery Ventures Inc has entered into an agreement to acquire the idle Max molybdenum mine's milling facilities to process ore from their **Willa** gold and silver enriched polymetallic project near Silverton.

Klondike Silver Corp's continued its operations at the **Slocan Silver** project in this rich historic silver, lead, and zinc camp near New Denver. The Silvana mill processed an average of 40 tonnes per day of ore until it was shut down in the latter half of the year. The company is searching for sufficient ore to operate the mill at its maximum capacity of 100 tonnes per day.

Northeast of Revelstoke, Huakan International Mining Inc continued

metallurgical test work at the **J&L** gold and silver enriched polymetallic project at the north end of the Kootenay Arc geological trend.

Nickel and Magnesium (Ultramafic associated)

First Point Minerals Corp reported an extension of the Baptiste deposit at the **Decar** project that has increased the indicated resource to 1159.51 million tonnes of 0.124% nickel at a 0.06% cut-off grade (Davis Tube Recoverable). Cliffs Natural Resources Exploration Canada Inc will fund a prefeasibility study for the project. Conceptually, a 114 000 tonne-per-day open-pit operation using on-site magnetic separation and gravity concentration would produce a 13.5% nickel concentrate with iron (45-50%) and chromium (about 2%) by-products. This would produce 37 400 tonnes per year of nickel over 24 years and is projected to cost approximately \$2.1 billion. The company explored the **Wale** and **Orca** prospects this year as well. At Hard Creek Nickel Corp's **Turnagain** ultramafic nickel-copper-cobalt project, investigations on controls and speciation of platinum mineralization began.

Specialty Metals (REE, Tantalum, Niobium) (Carbonatite or Alkaline Intrusive-related)

Taseko Mines Ltd continued metallurgical testing on **Aley** samples, successfully producing a niobium concentrate, and is preparing the process flow sheet for a feasibility study. Commerce Resources Corp delayed planned resource updates at its **Blue River** tantalum-niobium project.

Iron Projects (Skarns, Magmatic cumulates)

On Vancouver Island, an application to re-open Canadian Dehua International Mines Group's **Iron Ross** magnetite mine is pending further exploration. Among other iron skarn prospects on Vancouver Island, the company acquired the **Pearson** project and conducted reconnaissance geological work in advance of drilling.

The **Tasu Aggregate** project of Coastal Construction Aggregates Ltd is now permitted to produce aggregate products from waste materials at the past producing Tasu magnetite mine on Moresby Island. They may also assess the marketing of magnetite fines found at the site.

Near Tulameen, private company Magnetite Ridge Metals and Minerals Ltd is pursuing a mine lease at its **Magnetite Ridge** project, where metallurgical studies indicate its magnetite is suitable for both steel smelter feed and a coal cleaning heavy medium.

Industrial Minerals, Aggregate and Semi-precious minerals

THE INDUSTRIAL MINERALS AND AGGREGATE PRODUCTION INDUSTRY IN THE PROVINCE IS SIGNIFICANT, ESTIMATED AT APPROXIMATELY 10 PER CENT OF TOTAL MINE PRODUCT VALUE. CEMENT AND CONSTRUCTION AGGREGATES MAKE UP THE LARGEST SHARE OF THE PRODUCTS

Industrial minerals, produced at more than 30 quarries in the province, include over forty different minerals such as gypsum, magnesite, limestone, graphite, mineral wool (gabbro), and dimension stone. Aggregate is produced at over 1000



Aggregate is a significant part of the mining industry in the province and over 1000 operations produce sand, gravel or crushed materials largely for the construction industry. Shown here is the Upland Excavating Ltd pit near Campbell River.

operations, and includes sand and gravel or crushed aggregate, mainly for the construction industry.

Large quarries on the coast are well placed to serve the Lower Mainland, Vancouver Island, and US Pacific Northwest markets by barge, while those with access to freighter load out facilities can also supply the eastern Pacific international markets, California, Mexico, and Hawaii.

The centerfold map in this publication shows the location of some of the industrial mineral mines, their names, and primary product. The companion document *Regional Geologist Summaries, Exploration and Mining in British Columbia 2013* contains detail on many of them.

A few examples are included here to represent activity in the province and some of the diverse products in the sector.

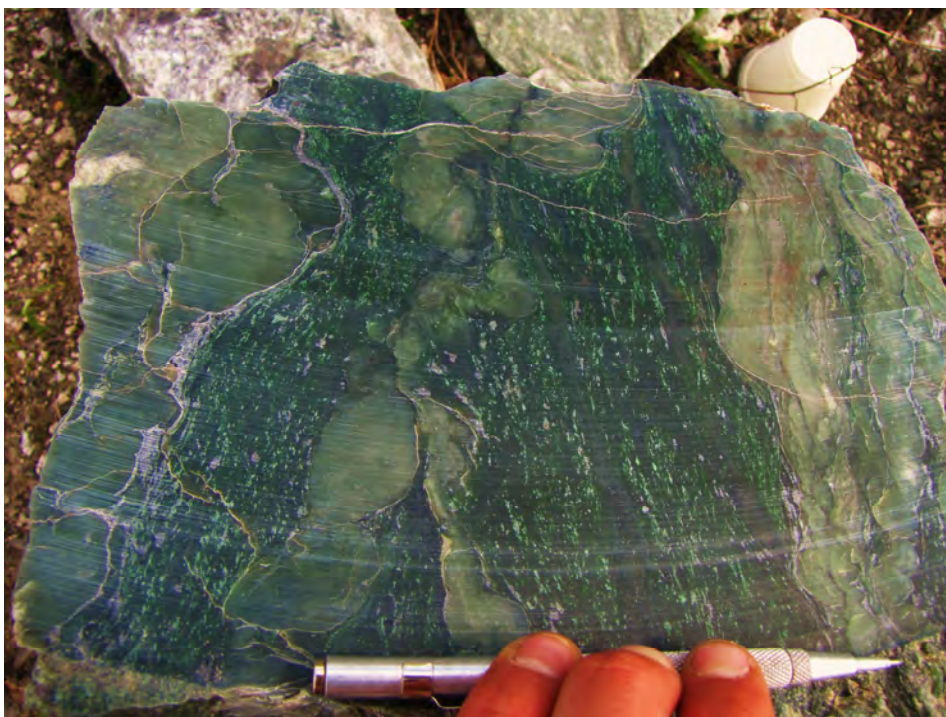
The **Texada Island** operation (Texada Quarrying Ltd), one example of a large coastal limestone quarry, produces up to 4.0 million tonnes each year. This year they drilled around the quarry to upgrade its limestone quality information of an inventory that could last 100 years or more. Graymont

Western Canada Inc (a subsidiary of Graymont Ltd), the second largest producer of lime in North America, announced it was conducting an Environmental Impact Assessment and consultation process for the **Giscome** lime plant and quarry northeast of Prince George.

Eagle Graphite's **Black Crystal** graphite quarry northwest of Nelson, is one of only two active producers of graphite in North America over the past 20 years, and exploration for flake graphite was active in the Kootenays. Noram Ventures Inc reported drill results from their **Kokanee** property, and also drilled the **Jumbo** property, while Lithium Corporation focused efforts at their **BC Sugar** property.

Fireside Minerals Ltd mined barite from its **Fireside** operation near the Yukon border for use primarily as a dense additive in drilling fluids. Fertoz International Inc continued hand-portable drilling, hand trenching, and mapping at the **Wapiti East** phosphate project northeast of Prince George.

The interest in nephrite jade deposits has increased significantly, mainly from Asia. Seasonal operations in the Dease Lake and the Fort Saint James area by private operators serve this



Industrial minerals are produced at more than 30 quarries in the province and include over forty different minerals such as gypsum, magnesite, limestone, dimension stone and semi-precious minerals. There has been significant increase interest in nephrite jade as shown here. Seasonal operations in the Dease Lake and Fort St. James supply this market with both finished and raw products.

market with both finished and raw products. Opal Resources Canada Inc produces fire opal gemstones and jewelry from the **Klinker** property, located west of Vernon.

The British Columbia Geological Survey

The BC Geological Survey, established in 1895, is responsible for the collection, long-term maintenance, and delivery of geoscience information in the province with the primary objective of stimulating and facilitating exploration for minerals and coal.

The survey had more than 20 field-based projects in 2013, several in partnership with other agencies. Much of the focus was on porphyry environments, with mapping in fertile Quesnel and Stikine arc terranes. Several projects focused on exploration methods (porphyry indicator minerals and VMS geochemistry) and mineral deposit studies (Ni-Cu-PGE and Specialty

Metals).

The Branch's sample processing lab is functional again, as is a new XRF lab and a fluid inclusion lab. The widely-used digital geology map is being updated. Property File is an increasingly important repository of exploration data, now with over 45 000 documents for free download. All geoscience publications and digital data are available online at the BCGS website: www.em.gov.bc.ca/geology.

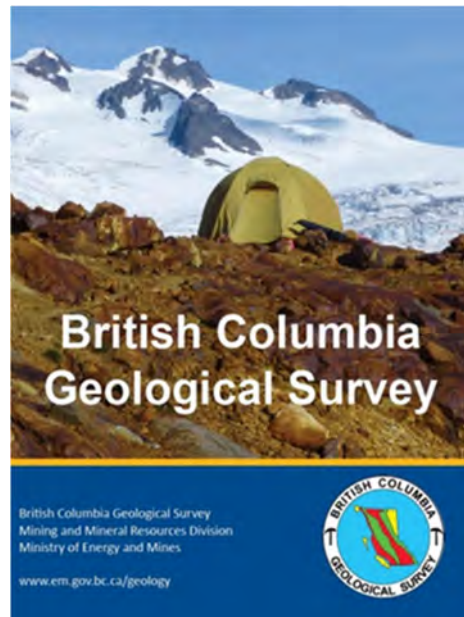
The Geological Survey of Canada

In the Kootenays, the Geological Survey of Canada is conducting a multi-year project for SEDEX-style and related base metal mineralization, the Targeted Geoscience Initiative (TGI-4). The focus of the project is to generate a regional 3D geoscience model of the Purcell Anticlinorium and Belt-Purcell stratigraphy, which hosted the historic Sullivan Mine. Geological, geophysical, and geochemical data are being compiled in order to generate new perspectives and understanding on ore controls for SEDEX targeting.

Geoscience BC - Public Geoscience Delivery Outside of Government

Geoscience BC (GBC) is an industry-led, not-for-profit, applied geoscience organization. Established in 2005, its mandate includes the collection, interpretation, and distribution of geoscience data and expertise to attract investment in mineral and oil & gas exploration and development in the province.

To accomplish this, GBC works in partnership with industry, academia, government, First Nations, and communities to identify and fund applied geoscience projects.



A detailed profile of the British Columbia Geological Survey is now available.



The next generation of the MapPlace, a series of map-based data portals, is in development. The redesign will improve appearance and performance while preserving the flexibility and search capabilities that made original versions so effective.

Highlights from 2013 include:

- Appointment of new President and CEO, Robin Archdekin, on October 1, 2013.
- Launch of the TREK Project, short for Targeting Resources through Exploration and Knowledge in March. Major Year One activities included a high-resolution airborne geophysical survey and a regional geochemical survey.
- Installation of six new seismic stations and their integration into the Canadian Seismographic Network as part of the Induced Seismicity Monitoring Project in northeast BC launched in late 2012. The project will help delineate the relationship between natural gas development operations and induced seismicity.
- Launch of a project titled Quantification of the Gas and Liquids in Place and Flow Characteristics of Shale and other Fine-Grained Facies in BC to help vector natural gas exploration efforts in northeast BC.
- Continuation of the SEEK (Stimulating Exploration in the East Kootenays) Project with two new projects.
- Release of twenty reports throughout the year plus the seventh annual Summary of Activities volume, containing fourteen technical reports on GBC's ongoing and recently completed projects.

For more information on GBC, its activities and project results go to www.geosciencebc.com.

Foreign Investment Initiatives

THROUGHOUT THE YEAR, THE PROVINCE'S NATURAL RESOURCE SECTOR STAFF PROVIDE INFORMATION TO POTENTIAL INVESTORS, BOTH DOMESTICALLY AND ABROAD

Opportunities exist for companies to attract foreign interest or investment using government services and staff. The province participates in international investment missions showcasing mineral and coal opportunities. If you are interested in profiling your projects or investment opportunities in upcoming events, connect with the BC Mineral Development Office in Vancouver for more information.

Acknowledgments

The information contained in this publication, and covered in more detail in the publication *Regional Geologist Summaries, Exploration and Mining in British Columbia 2013* is provided by British Columbia's Regional Geologists based in Cranbrook, Kamloops, Prince George, Smithers and Vancouver. Total Earth Science Services provided formatting and desktop publication services.



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Forecast Mine Production and Reserves 2013

Mine	Operator	Deposit Type/Commodity	Forecast 2013 Production	Proven and Probable Reserves (on Dec 31, 2013/Jan 1, 2014 or as indicated)
<u>METALS</u>				
Bralorne	Bralorne Gold Mines Ltd	Vein / Au	106 kg Au	N/A
Copper Mountain Mining Corporation / Mitsubishi Materials Corporation	Copper Mountain Mining Corporation / Mitsubishi Materials	Alkalic porphyry / Cu	28 800 t Cu, 710 kg Au, 8 895 kg Ag	211 Mt at 0.36% Cu, 0.1 g/t Au, 1.38 g/t Ag (July 2009)
Endako	Thompson Creek Metals Company	Porphyry / Mo	4 114 000 kg	305.4 Mt at 0.046% Mo
Gibraltar	Taseko Mines Limited / Cariboo Copper Corp	Calc-alkalic porphyry / Cu, Mo	53 300 t Cu, 585 t Mo	790 Mt at 0.30% Cu and 0.008% Mo (Dec 2012)
Highland Valley Copper	Teck Highland Valley Copper Partnership	Calc-alkalic porphyry / Cu, Mo	106 000 t Cu, 2 660 t Mo	697.4 Mt at 0.29% Cu and 0.008% Mo (Dec 2012)
Mt Milligan	Thompson Creek Metals Company	Alkalic porphyry / Cu, Au	4900 t Cu, 656.3 kg Au, 1300 kg Ag	482.4 Mt at 0.39 g/t Au, 0.20% Cu (Dec 2012)
Huckleberry	Huckleberry Mines Ltd	Porphyry / Cu, Mo	18 600 t Cu, 91 kg Au, 7 400 kg Ag	49.9 Mt at 0.334% Cu, 0.009% Mo (Dec 2012)
Mount Polley	Imperial Metals Corp	Alkalic porphyry / Cu, Au, Ag	17 695 t Cu, 1 470 kg Au, 2 955 kg Ag	93.1 Mt at 0.297% Cu, 0.299 g/t Au and 0.62 g/t Ag (Jan 2013)
Myra Falls	NVI Mining Ltd (Nyrstar N.V.)	Zn, Cu, Pb, Au, Ag	~ 0.5 Mt throughput (head grades 5.35% Zn, 0.49% Pb, 0.83% Cu, 1.36 g/t Au, 50.63 g/t Ag)	5.43 Mt at 5.62% Zn, 0.56% Pb, 0.94% Cu, 1.6 g/t Au, 58 g/t Ag
New Afton	New Gold Inc	Alkalic porphyry / Cu, Au, Ag	31 085 t Cu, 2 570 kg Au	52.5 Mt at 0.65 g/t Au, 2.3 g/t Ag, 0.93% Cu (Dec 2012)
QR (Intermittent)	Barkerville Gold Mines Ltd	Skarn / Au	N/A (~15 000 tonnes of ore stockpiled by Oct 2013)	N/A
Shasta	Sable Resources Ltd	Low Sulphidation Epithermal / Au, Ag	N/A	5000 t (Dec 2012)
<u>COAL</u>				
Basin (June 2013 start up. Oct 2013 shut down /care and maintenance)	Coalmont Energy Corp	Thermal coal	> 100 000 t (June to October)	N/A
Brule	Walter Energy Inc	ULV-PCI coal	1.4 Mt	19.4 Mt
Coal Mountain	Teck Coal Limited	PCI and thermal coal	2.50 Mt	15.9 Mt
Elkview	Teck Coal Limited	Metallurgical coal	5.35 Mt	215 Mt
Fording River	Teck Coal Limited	Metallurgical and thermal coal	8.92 Mt	626.5 Mt
Greenhills	Teck Coal Limited	Metallurgical, PCI and thermal coal	4.54 Mt	75.3 Mt
Line Creek	Teck Coal Limited	Metallurgical, PCI and thermal coal	3.4 Mt	67.2 Mt
Quinsam	Quinsam Coal Corp (Hillsborough Resources Ltd)	Thermal coal	365 000 t clean coal	N/A
Trend	Walter Energy Inc	Hard coking coal (HCC)	1.8 Mt	20.2 Mt
Willow Creek	Walter Energy Inc	ULV-PCI, HCC	0.45 Mt	19.0 Mt
Wolverine (Perry Creek)	Peace River Coal Inc (Anglo American plc)	Hard coking coal (HCC)	1.8 Mt	11.0 Mt

Selected Active Exploration Projects 2013

Property Name	Operator Name	MINFILE	Commodity	Deposit Type
3Ts	Independence Gold Corp	093F 055, 068	Au, Ag	Low-sulfidation epithermal / vein
Ajax	KGHM International Ltd	092INE 012, 013, 028, 030	Cu, Au, Ag, Pd	Porphyry
Akie	Canada Zinc Metals Corp	094F 031	Zn, Pb, Ag	Sedex
Aley	Taseko Mines Ltd	094B 027	Nb	Carbonatite-hosted
Arctos Anthracite	Fortune Minerals Limited	104H 022	Anthracite	Sedimentary
Aspen East	Redhill Resources Corp	093F 004, 059	Au, Ag, Cu, Mo	Low-sulfidation epithermal, porphyry
Big Bear	Parlane Resource Corp		Au, Ag	Low-sulfidation epithermal
Big Onion	Metal Mountain Resources	093L 124	Cu, Mo, Au Ag	Porphyry
Big Strike	Rainbow Resources Inc.	082FNW193, 082FSW222, 082FSW177	Au	Vein
Bingay Main	Centremount Coal Ltd	082JSE011	Coal	Sedimentary
Blackdome	Sona Resources Corp	092O 053, 051, 052	Au, Ag	Vein / Breccia
Blackwater	New Gold Inc	093F 037	Au, Ag	Intermediate-sulfidation epithermal
Blackwater West	RJK Explorations Ltd	(093F.015, 016, 005, 006)	Ag, Cu, Zn, Pb	Low-sulfidation epithermal
Blue River	Commerce Resources Corp	083D 005, 035	Ta, Nb	Magmatic
Bonanza Ledge	Barkerville Gold Mines Ltd	093H 019	Au	Vein / Breccia
Brenda	Canasil Resources Inc	094E 147	Au, Cu	Porphyry
Brucejack	Pretium Resources Inc.	104B 193	Au, Ag	Vein, Porphyry
Captain	Orestone Mining Corp	093J 026	Cu, Au	Alkalic porphyry
Carbon Creek	Cardero Resources Corp	093O 028	Metallurgical Coal	Sedimentary
Cariboo Gold Quartz	Barkerville Gold Mines Ltd	093H 019	Au	Vein / Breccia
Castle	Freeport MacMoran	104G 076	Au, Cu, Mo, Ag	Porphyry
Cirque	Teck Resources Ltd	094F 008	Zn, Pb, Ag	Sedex
Coal Creek	Crownsnest Pass Coal Mining Ltd	082GSE035	Coal	Sedimentary
Crown Mountain	James Resources Ltd	082GNE018	Coal	Sedimentary
Decar	Cliffs Natural Resources Inc	093K 039, 041, 072	Ni	Ultramafic
Deer Horn	Deer Horn Metals Inc.	093E 019	Au, Ag, Te	Vein / Breccia
Dillard	Fjordland Exploration Inc / Sumac Mines Ltd	092HNE 042	Cu	Porphyry
Dolly Varden	Dolly Varden Silver Corporation	103P 188	Ag	Vein / Breccia
Dome Mountain	Gavin Mines Inc	093L 022	Au	Vein / Breccia
EB	Walter Energy Inc (Western Coal Corp)	093P 015	Metallurgical coal	Sedimentary
Echo Hill	Hillsborough Resources	093P 021	Coal	Sedimentary
Elizabeth	Sona Resources Corp	092O 012	Au, Ag, Cu, Mo	Vein / Breccia
Elk	Gold Mountain Mining Corporation	092HNE 096	Au, Ag	Vein / Breccia
Flute	Riverside Resources	093L 167	Cu, Au, Ag, Mo	Porphyry
Fox	Happy Creek Minerals Ltd	093A 259	W, Mo, Ag	Skarn
Frank Creek	Barker Minerals Ltd	093A 152	Zn, Pb, Ag	Massive sulphide

Frog	International Samuel Exploration Corp	094L 014, 09E 030	Cu, Au, Ag, Mo, Rh	Porphyry
Galore Creek	Galore Creek Mining Corp.	104G 090	Au, Cu	Porphyry
Gething	Canadian Kailuan Dehua Mines Co Ltd	093O 025, 029	Metallurgical coal	Sedimentary
GJ	Teck Resources Limited	104G 034	Cu, Au	Porphyry
Gnat Pass	Amarc Resources + Quartz Mountain	104I 001	Cu, Au	Porphyry
Granduc	Castle Resources Inc.	104B 021	Cu, Ag, Au	Massive sulphide
Greenwood Gold	Grizzly Discoveries Ltd	082ESW022, 210, 231	Au, Cu, Ag, Mo, Zn, Pt	Porphyry
Groundhog	Atrum Coal	104A 078	Anthracite Coal	Sedimentary
Harper Creek	Yellowhead Mining Inc	082M 008, 009	Cu, Ag, Au, Zn, Mo	Stratiform Sulphide
Hat	Doubleview Capital Corp.	104J 015	Cu, Au, Ag	Porphyry
High	Teuton Resources Corp.		Au, Ag	Vein / Breccia
Homestake Ridge	Agnico Eagle Mines	103P 216	Au, Ag, Zn	Vein / Breccia
Horizon Ridge	Peace River Coal Inc (Anglo American plc)	093I 032	Metallurgical Coal	Sedimentary
Huguenot	Colonial Coal International Corp	093I 014 (93I 049,059)	Metallurgical coal	Sedimentary
Itsit	Kettle River Resources Ltd.	93L 002	Au, Cu, Mo	Porphyry
J&L	Huakan International Mining Ltd	082M 003	Au, Pb, Zn, Ag	Sedex, Vein
Kemess Underground	AuRico Gold Inc	094E 021 (094E.007)	Cu, Au, Ag	Porphyry
Kena	Altair Gold Inc	082FSW237, 332, 379	Au, Cu	Porphyry
Key	Troymet Exploration Corp	093F 069	Au, Ag, Zn, Pb, Cu, Mo	Porphyry
Kitsault	Avanti Mining Inc	103P 120	Mo	Porphyry
Kliyul	Kiska Metals Corp	094D 023	Cu, Au	Porphyry
KSM	Seabridge Gold Inc.	104B 103	Au, Cu, Mo, Ag	Porphyry
Kwanika	Serengeti Resources Inc	093N 073	Cu, Au, Ag, Mo	Porphyry
Ladner Gold	New Carolin Gold Corp	092HNW007, 003, 018	Au	Veins
Lennac	Riverside Resources	093L 190	Cu, Mo	Porphyry
Lunar	Stratton Resources Inc.	094 60, 61	Cu, Au	Porphyry
Maggie	Constantia Resources Ltd	092INW 015	Cu, Mo, Ag	Porphyry
Man-Prime	Sunrise Resources Ltd	092HNE 243	Cu, Au	Porphyry
Marten Wheeler	Teck Coal Ltd	082GNE006	Coal	Sedimentary
Michel Creek	CanAus Coal	082GSE050	Coal	Sedimentary
Miner Mountain	Sego Resources Inc	092HSE 078, 203	Cu, Au, Ag	Porphyry
Morrison	Pacific Booker Minerals Inc.	093M 007	Cu	Porphyry
Murray River	HD Mining International Ltd	(093P 005, 093I 095)	Metallurgical coal	Sedimentary
New Prosperity	Taseko Mines Ltd	092O 041	Cu, Mo, Au	Porphyry
Newmont Lake	Romios Gold Resources Inc.	104B 281	Au, Ag	Skarn
North ROK	Colorado Resources Ltd.	104H 035	Cu, Au	Porphyry
Ootsa	Gold Reach Resources Ltd.	093E 105	Cu, Au	Porphyry
Pliny	West Cirque Resources	104I 026	Cu, Ag	Marine Volcanic Association
Premier	Ascot Resources Ltd	104B 054	Au, Ag, Pb, Zn, Cu, Cd	Low-sulfidation epithermal / vein
Princeton	Anglo-Canadian Mining Corp		Cu, Au	Porphyry

Quintette-Babcock	Teck Resources Ltd	093I 011	Metallurgical coal	Sedimentary
Rateria	Happy Creek Minerals Ltd	0921ISE092, 150, 060, 018	Cu, Mo	Porphyry
Raven	Comox Joint Venture	092F 333	Coal (met +/- thermal)	Sedimentary
Red Mountain	Bank Island Gold	103P 086	Au	Other
ROK	OZ Minerals JV	104H 012	Mo, Cu	Porphyry
Ruddock Creek	Imperial Metals Corporation	082M 082	Zn, Pb, Ag	Massive sulphide
Schaft Creek	Copper Fox Metals Inc.	104G 015	Cu, Mo, Au, Ag	Porphyry
Shasta Mine	Sable Resources Ltd	094E 050	Au, Ag, Zn, Cu, Pb	Low-sulfidation epithermal
Sheslay	Prosper Gold	104J 035	Cu, Au	Porphyry
Slocan Silver	Klondike Silver	082FNW050	Ag, Pb, Zn	Vein
Spanish Mountain	Spanish Mountain Gold Ltd	093A 043	Au, Ag	Vein / Breccia
Sukunka	Glencore	093P 014	Metallurgical coal	Sedimentary
Sully	Santa Fe Metals Corp		Pb, Zn, Ag	Sedex
Summit	Pistol Bay Mining Inc.	103O 013	Au, Ag, Pb, Zn, Cu	Vein
Suska	Glencore	0930 050	Metallurgical coal	Sedimentary
Takla-Rainbow	Manado Gold Corp	093N 082	Au-Cu	Vein, porphyry
Tanzilla	West Range Exploration Ltd	104I 023	Cu, Au	Porphyry
Thor	Taranis Resources Inc	082KNW030, 031, 060, 061	Au, Ag, Pb, Zn	Sedex, Vein
Thorn	Brixton Metals Corp	104K 031	Au, Cu	Vein / Breccia
Tide-Tennyson	Teuton Resources Corp.	104B 167	Au, Ag, Pb, Zn, Cu	Skarn
Trout	Venerable Ventures Ltd	093F 044	Au, Ag	Low-sulfidation epithermal
Tulsequah Chief	Chieftain Metals Inc	104K 002	Cu, Zn, Ag, Au	Massive sulphide
Turnagain	Hard Creek Nickel Corp.	104I 119	Ni, Co, Pt, Pd, Cu	Magmatic
Vine	PJX Resources Inc	082GSW050	Pb, Zn, Ag, Au	Sedex, Vein
Wapiti River	Canadian Dehua International Mines Group Inc	093I 013	Metallurgical coal	Sedimentary
Woodjam	Gold Fields Horsefly Exploration Corporation	093A 019	Cu, Au	Porphyry
Yellow Giant	Banks Island Gold	103G 021	Au, Ag	Vein / Breccia