MINES & MINERAL EXPLORATION OVERVIEW 2009





Ministry of Energy, Mines and Petroleum Resources

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BRITISH COLUMBIA MINING AND MINERAL EXPLORATION OVERVIEW 2009

Ministry of Energy, Mines and Petroleum Resources

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INTRODUCTION

British Columbia is Canada's largest producer of copper, its only producer of molybdenum and the largest exporter of coal. The province's many mines and quarries also produce a wide variety of commodities and products, including gold, silver, zinc, molybdenum, lead, magnesite, gypsum, limestone, dimension stone and aggregate. This reflects only part of British Columbia's rich resource potential as its diverse geology hosts a wide range of mineral commodities, including over 30 different industrial minerals.

Enhancing understanding of British Columbia's geological potential are the award-winning, easily accessible geoscience databases. The province's strategic location on the Pacific Rim, provides easy access to world markets and in particular, reduced shipping times from North America to key, growing markets in Asia. These advantages, together with attractive energy costs, a well-developed, all-weather highway system, rail links and a number of deep water ports, mean British Columbia can move its mineral commodities to world markets quickly and efficiently.

The total value of solid mineral production for British Columbia for 2009 is estimated at \$5.7B. Late in 2008, one new metal mine, **Lexington-Grenoble**, halted operation and operations at the **QR** mine were suspended as the company underwent restructuring. The operating metal mines declined to 8 and there were no changes in the number of operating coal mines in the province, which remained at 9.

Photo 1. A Jumbo drill at the New Afton mine development site which now includes over 5 km of underground development and a 4.5 km conveyor decline that is nearing completion. Photo courtesy of New Gold Inc.

Mineral exploration spending in 2009 is estimated at \$154 million. This is down substantially from the \$367 million in 2008, but is still the 6th highest provincial expenditure in the past 20 years. The drop in spending reflects the impact of the global financial crisis on the mineral exploration industry, making it difficult to raise capital in the markets. The impact varied by commodity. Coal prices remained strong by historic standards and spending in the Northeast Region was very similar to 2008 levels. Overall, exploration spending remains at a significant level compared to historic spending (Figure 1), a late-year rally resulted in a significant increase in 2009 spending as a result of copper prices that moved above the US\$3/lb threshold and gold prices breaking the US\$1000 an ounce threshold later in the year.

The number of significant exploration projects in the province was 88, composed of 75 metallic mineral projects and industrial projects. 6 coal 7 mineral/aggregate projects. There were 30 mine development applications for proposed mines to the provincial Environmental Assessment Office (EAO; 23 projects) and to the British Columbia Ministry of Energy, Mines and Petroleum Resources (7 projects). In addition, there are 6 mine development projects that are fully permitted.

People employed in British Columbia's mineral industry (mine and mill workers, engineers and geoscientists, managers and technical experts in many fields) are highly skilled and productive and are in demand throughout the world. Vancouver has become a



Figure 1. Mineral exploration expenditures 1974 - 2009.

major financial centre strongly oriented to international trade in natural resources. Vancouver is also an important source of capital for mineral exploration and mine development, both within the province and internationally. British Columbia is internationally recognized as a centre of excellence in mining and related fields, such as metallurgy, environmental engineering, mine safety and the geosciences.

More than half of the Canadian exploration and mining companies are based in British Columbia, which has the world's largest concentration of exploration companies and mining professionals. British Columbiabased companies have raised billions of dollars in equity capital on the TSX and TSX Venture Exchanges in recent years. This economic activity was carried out by more than 700 publicly-listed British Columbia companies.

The British Columbia government supports mining as a key part of the provincial economy. One of the advantages of exploring and mining in British Columbia is attractive tax rates and programs. The *Mining Exploration Tax Credit Program* and *Exploration Investment Tax Credit* for flow-through investors, provide additional incentives to attract risk capital to the province. The British Columbia and federal non-refundable tax credits, when added to the regular 100% deductions are equivalent to a 141% exploration expense deduction for income tax purposes. In addition, the *Mining Exploration Tax Credit* has been increased to 30% for qualified mineral exploration undertaken in prescribed Mountain Pine Beetle affected areas of the province.

Enhancing British Columbia's geologic potential and modern infrastructure is the government's geoscience database and modern, web-based mineral tenure system. Two of the main pillars of the system are MapPlace and Mineral Titles Online. MapPlace is an online application that provides easy interactive map access to information related to British Columbia's geology, mineral exploration, mining and energy resources. Mineral Titles Online allows people to acquire and maintain mineral titles by establishing mineral dispositions on a seamless digital geographic information system.

Throughout this report, the descriptions of mines, mine development projects and exploration properties are presented by region. This overview article describes only the larger exploration projects. The overview is closely linked to the map of *Operating Mines and Selected Major Exploration Projects in British Columbia 2010* (Open File 2010-1), a version of which is included as the centre piece of this document. Readers are encouraged to refer to the more detailed regional overviews presented in *Exploration and Mining in British Columbia 2009* for additional information.

MINING HIGHLIGHTS

Coal, copper and molybdenum are expected to remain B.C.'s first, second and third most important solid mineral products by value, with coal widening its lead in 2008 and continuing at about this level in 2009. Nearly all of these products are exported. The value of solid mineral production in 2009 is estimated at approximately \$5.7 billion, down from the \$6.7 billion reported in 2008. Production and reserve estimates for the individual mines are listed in Table 1.

Coal production in B.C. is forecast to be approximately 21.7 Mt in 2009. As coal prices remained strong, while not at record levels achieved in 2008, exploration spending in the coal sector was not down to the same degree as for some other mineral commodities. The large majority of coal produced in B.C. is metallurgical, specifically hard coking coal. In recent years, most of the coal from the southeast coalfields has gone to Asia, while approximately one-third of the coal is shipped to Europe. The northeast coalfields ship to these



Photo 2. Overview of Fording River Operations' Eagle Mountain.



Figure 2. Solid mineral production value in British Columbia, 1990 – 2009.



Figure 3. Operating Mines and Quarries in British Columbia, 2009.

destinations and also South America. There are three major coal terminals at British Columbia's ports. The largest bulk terminal on the western coast of the Americas is **Westshore Terminals** at Roberts Bank near Vancouver with a capacity of approximately 24 Mt per year. An expansion to 29 Mt per year is scheduled for completion in January 2010. **Neptune Bulk Terminals** in North Vancouver has a capacity of 8 Mt per year (also expandable) and **Ridley Island Terminal** at Prince Rupert is operating significantly below its current capacity of 12 Mt. The Canadian National rail line to Prince Rupert also has significant unused capacity. There is an additional ice-free, deep water, bulk terminal at Stewart.

The contribution of industrial mineral and aggregate production is also significant, estimated at 11% and 6% of the total value respectively. The value of industrial minerals production in 2009 is estimated at over \$650 million. A major part of this is cement, a value added product made from locally mined raw materials. Construction aggregates are estimated to be worth more than \$340 million. Several million tonnes



Figure 4. Forecast distribution of British Columbia mineral production by commodity.

are exported from large coastal quarries, California being the largest market. There were more than 30 active industrial minerals quarries in 2009 and well over 1000 aggregate operations varying from large quarries operating continuously to small borrow pits used infrequently.

	Mine	Operator	Deposit Type/Commodity	Forecast 2009 Production	Proven and Probable Reserves (on Dec 31, 2008/Jan 1, 2009 or as indicated)
Metals	;				
	Endako	Thompson Creek Metals Company	Porphyry Mo	3000 - 4200 t Mo	279 200 000 t at 0.050 % Mo
	Gibraltar	Taseko Mines Limited	Calcalkalic porphyry / Cu-Mo	32 000 t Cu, 310 t Mo	428 000 000 t at 0.315 % Cu, 0.008 % Mo
	Highland Valley Copper	Teck Cominco Ltd/ Highmont Mining Company Ltd	Calcalkalic porphyry / Cu-Mo	115 000 t Cu, 2700 t Mo, minor Au and Ag	430 500 000 t at 0.38 % Cu, 0.007 % Mo
	Huckleberry	Huckleberry Mines Ltd (50% Imperial Metals Corp)	Porphyry Cu-Mo	16 000 t Cu	8 368 000 t at 0.362 % Cu, 0.005 % Mo
	Kemess South	Northgate Minerals Corp	Calcalkalic porphyry / Au-Cu	5340 kg Au, 23 500 t Cu	34 200 000 t at 0.17 % Cu, 0.41 g/t Au
	MAX	Roca Mines Inc	Porphyry Mo	964 t Mo	1 700 000 t at 0.73 % Mo measured-plus-indicated resource (December 2009)
	Mount Polley	Imperial Metals Corp	Alkalic porphyry / Cu- Au-Ag	19 000 t Cu, 1650 kg Au, 7200 kg Ag	46 200 000 t at 0.34 % Cu, 0.29 g/t Au, 0.95 g/t Ag
	Myra Falls	NVI Mining Ltd (Breakwater Resources Ltd)	VMS / Zn-Cu-Au-Ag	31 500 t Zn, 3500 t Cu, 17 325 kg Ag, 440 kg Au (metal in concentrate)	6 298 000 t at 5.2 % Zn, 0.5 % Pb, 0.9 % Cu, 44 g/t Ag, 1.3 g/t Au
Coal					
	Basin	Compliance Energy Corp	Thermal coal	0 (on care and maintenand	ce)
	Brule	Western Canadian Coal	PCI coal	475 000 t clean coal	34 300 000 t (April 2009)
	Coal Mountain	Corp Teck Coal Limited	Metallurgical coal	2 360 000 t clean coal	27 900 000 t
	Elkview	Teck Coal Limited	Metallurgical coal	4 250 000 t clean coal	232 600 000 t
	Fording River	Teck Coal Limited	Metallurgical coal	6 140 000 t clean coal	256 500 000 t
	Greenhills	Teck Coal Limited	Metallurgical coal	3 500 000 t clean coal	81 300 000 t
	Line Creek	Teck Coal Limited	Metallurgical and thermal coal	2 090 000 t clean coal	14 900 000 t
	Quinsam	Quinsam Coal Corp (Hillsborough Resrouces	Thermal and PCI coal	390 000 t clean coal	22 073 000 t
	Trend	Ltd) Peace River Coal Inc	Metallurgical coal	1 000 000 t clean coal	17 000 000 t
	Wolverine (Perry Creek)	Western Canadian Coal Corp	Metallurgical coal	1 461 000 t clean coal	28 900 000 t (April 2009)
Industrial Minerals (selected)					
	4J	Georgia-Pacific Canada Inc	Gypsum		
	Ashcroft	IG Machine and Fiber Ltd (IKO Industries Ltd)	Basalt (Roofing granules)		
	Benson Lake	Imasco Minerals Inc	Limestone		
	Blubber Bay	Ash Grove Cement Corp	Limestone aggregate, dolomitic limestone		
	Bud	Absorbent Products Ltd	Bentonite		
	Buse Lake	Lafarge Canada Inc	Volcanic ash (alumina-silica)		
	Craigmont	Craigmont Mines Joint	Magnetite tailings		
	Crawford Bay	Imasco Minerals Inc	Dolomite		

TABLE 1. CONTINUED

Mine	Operator	Deposit	Forecast 2009	Proven and Probable
		Type/Commodity	Production	Reserves (on Dec 31,

2 ir

Proven and Probable				
Reserves (on Dec 31,				
008/Jan 1, 2009 or as				
ndicated)				

Industrial Minerals (selected)

Decor	Pacific Bentonite Ltd	Alumina, landscape rock	
Elkhorn	CertainTeed Gypsum Canada	Gypsum	
Falkland	Lafarge Canada Inc	Gypsum	
Fireside	Fireside Minerals Inc	Barite	
Garibaldi Pumice	Garibaldi Pumice Ltd	Pumice	
Gillies Bay	Texada Quarrying Ltd (Lafarge North America Inc)	Limestone, aggregate	
Giscome	Pacific Lime Products Ltd	Limestone	
Giscome	Canadian National Railway Company	Basalt (railroad ballast)	
Harper Ranch	Lafarge Canada Inc	Limestone	
Hunterstone	Hunterstone Quarries	Quartzite (dimension stone)	
Kettle Valley quarries	Kettle Valley Stone Company	Ashlar, flagstone, thin veneer	
K2	K2 Stone Inc	Flagstone, wall stone, thin veneer	
Lime Creek	Imasco Minerals Inc	Limestone	
Moberly	HCA Mountain Minerals (Moberly) Ltd	Silica sand	
Monteith Bay	Lehigh Hanson Materials Ltd	Geyserite	
Mount Bruccilof	Baymag Inc	Magnesite	
Mount Meager	Great Pacific Pumice Inc	Pumice	
Nazko	Lightweight Advanced Volcanic Aggregates Inc	Lava rock	
Pavilion	Graymont Western Canada Inc	Limestone	
PEM 100	Electra Gold Ltd	Geyserite	
Red Lake	Absorbent Products Ltd	Diatomaceous earth	
Sumas Mountain	Clayburn Industries Ltd and cement manufacturer (partners)	Clay, shale and sandstone	
Swansea Ridge	Canadian Pacific Railway	Gabbro (railroad ballast)	
Van Anda	Imperial Limestone Company Ltd	Limestone	
Winner	Roxul (West) Inc	Gabbro (mineral wool)	
Zeotech Bromley Creek	Heemskirk Canada Ltd	Zeolite	

At least three of the operating metal mines began or continued expansion in 2008, but most of these programs were put on hold or modified in late 2008/early 2009. Higher commodity prices led to Endako, Gibraltar and Highland Valley resuming work

on their expansion plans in 2009. Teck Coal anticipates increasing coal production in 2010. One coal mine was planning a significant expansion, while the proposed reopening of the Willow Creek mine in early 2009 was deferred.

Northwest British Columbia - Major Mines

Output at the **Endako** open-pit molybdenum mine, owned by Thompson Creek Metals Company (75%) and Sojitz Corporation (25%), is forecast at between 3000 and 4200 t of molybdenum. A construction project to modernize and expand capacity of the mill from 28 000 to 50 000 t of ore per day is underway at an estimated cost of \$498 million. Three pits will coalesce into one 3.5 km-long 'superpit'. In-situ and stockpile ore reserves were 279.2 Mt grading 0.050% Mo.

The **Huckleberry** porphyry copper mine is owned 50% by Imperial Metals Corp. and 50% by a consortium of Japanese companies (Mitsubishi Material Corp, Dowa Mining Ltd., Furakawa Company Ltd. and Marubeni Corp). Forecast 2009 production is 16 000 t of copper. In June, a two year addition to mine life was announced, to early 2012. There is good potential for additional extensions depending on copper price. Huckleberry is a calc-alkalic porphyry deposit.



Photo 3. Endako molybdenum mine: the Endako, Denak East and Denak West (mined in 2009) will merge into a 3.5 km long 'superpit', north is to the left.

Northeast British Columbia - Major Mines

Production at Peace River Coal's (PRC) **Trend** mine, for 2009, was targeted at 1.0 Mt of mostly metallurgical coal with a small amount of thermal coal, from coal reserves of over 17 Mt.

Western Coal Corp. (WCC) continued production from its **Perry Creek** mine, with estimated production in 2009 of about 1.5 Mt/a of clean metallurgical coal from total reserves of 28.9 Mt. The **Brule** mine (WCC) is located adjacent to the former Dillon mine, which closed in September 2006 after reserves were exhausted. Forecast production in 2009 was 0.5 Mt of run-of-mine coal. *In situ* reserves as of April 2009 stood at 34.3 Mt. At present, coal from the Brule mine is trucked to the Bullmoose loadout facility.

North-Central British Columbia - Major Mines

Imperial Metals Corp forecasts 2009 production from its Mount Polley copper-gold mine at 19 000 t Cu and 1650 kg Au. Mount Polley is an alkalic porphyry copper deposit and the mine operates at 19 000 t of ore per day. Reserves were 46.2 Mt grading 0.34% Cu, 0.29 g/t Au and 0.95 g/t Ag, sufficient to the end of 2015. Most ore mined in 2009 came from the Springer pit where 85% of property reserves are located. The Pond zone was developed and the first ore is expected to be delivered to the mill in early 2010. Exploration at Mount Polley focused on drilling in the Boundary zone where a highlight drillhole returned a 157 m intersection grading 1.73% Cu, 1.11 g/t Au and 10.5 g/t Ag beginning at 158 m below surface. This and high grade intercepts in other zones are considered unsuitable to be mined by open-pit, in consideration of depth and strip ratio, and will be explored for potential underground mining.

The **Kemess South** porphyry copper-gold mine is 100% owned by Northgate Minerals Corporation and operates at 52 000 t of ore per day. Production in 2009 is forecast at 5340 kg Au (171 600 ounces) and 23 500 t Cu. Reserves at the beginning of 2009 stood at 34.2 Mt grading 0.41 g/t Au and 0.17% Cu. Mine closure is scheduled in early 2011.



Photo 4. Hauling coal at Western Coal Corp's Wolverine operations (Perry Creek Mine).



Photo 5. Blasting in the Springer Pit, Mount Polley Mine.

The **Gibraltar** copper-molybdenum mine continued a major expansion and modernization program in 2009 with a goal of increasing copper output by 50%. A total of \$250 million has been spent on new mining equipment and concentrator upgrades. Taseko Mines Limited, owner of the mine, announced a tentative agreement to sell 25% interest in Gibraltar to Sojitz Corporation. Ore reserves at the calc-alkalic deposit were 428 Mt at a grade of 0.315% Cu and 0.008% Mo, sufficient for 25 years of mine life at the new milling rate of 49 900 t per day. Gibraltar is expected to produce 32 000 t Cu and 310 t Mo in 2009, based on projection of data from the end of the third quarter to year-end.



Photo 6. Dave Lefebure, Chief Geologist for the British Columbia Geological Survey, and John Fleming, Senior Geologist for Taseko, hold up a copper sheet produced by the electrowinning plant at Taseko's Gibraltar Mine.

South-Central British Columbia - Major Mines

Highland Valley Copper, a partnership of Teck and Highmont Mining Company Ltd, continues to invest a large amount of capital and operation time towards both the 2013 and 2019 mine plans. The company received government approval in October for a new ore zone



Photo 7. Overburden stripping at the east wall expansion of the Valley pit at the Highland Valley Copper mine near Logan Lake.

within the Valley pit, which it will mine in conjunction with stripping above the west wall as part of the 2019 mine plan. Shortfalls in mill feed from the Valley pit due to geotechnical issues will be supplemented by lower grade ore from the Lornex and Highmont pits over the next year or more. Capital expenditures related to mine extension development are estimated at approximately \$120 million.

The Kamloops cement plant and Harper Ranch limestone quarry of Lafarge Canada Inc supply cement to meet western Canadian demand. Lafarge also draws materials from the Falkland and Buse Lake quarries, which provide gypsum and alumina-silica rock respectively. Pacific Bentonite Ltd also supplies aluminarich burnt shale to the Lafarge cement plant from its Décor mine near Cache Creek. Graymont Western Canada Inc operates the Pavilion limestone quarry and lime plant on the Pavilion Indian Reserve near Cache Creek and employ many of the Ts'kw'aylaxw First Nation in a 40 year lease arrangement. East of Ashcroft, IG Machine and Fiber Ltd, a subsidiary of IKO Industries Ltd, operates the Ashcroft basalt quarry and plant where it creates granules for its asphalt shingle plants in Canada and the United States of America.



Photo 8. The IG Machine and Fiber plant located at Ashcroft. The manufacturing plant produces the coloured granular coating applied to asphalt shingles.

South-Central British Columbia - Small Mines

There is one thermal coal mine in the region, the **Basin** mine of Compliance Energy Corporation located near Coalmont, which has been on care and maintenance since 2007. Feasibility studies are underway pertaining to the sale of the mine operation to Jameson Resources Limited of Australia.

Craigmont Mines Joint Venture operates the **Craigmont** magnetite recovery operation near Merritt where tailings from the old Craigmont copper mine are processed for use in coal washing plants.

At its plant in Kamloops, Absorbent Products Ltd manufactures cat litter, barn deodorizer, industrial absorbents and carriers for agricultural products. These are prepared from diatomaceous earth mined from the **Red Lake** quarry northwest of Kamloops and bentonite mined from the **Bud** quarry at Princeton. Heemskirk Canada Ltd continues to market agricultural and absorbent products in Alberta that are produced from a stockpile at the **Zeo-Tech/Bromley Creek** zeolite quarry near Princeton.

Opal Resources Canada Inc produces attractive fire opal gemstones and jewelry from the **Klinker** property, located west of Vernon and markets their products largely to the BC tourist market from a retail store in Vernon.

Decorative rock and dimension stone are produced at numerous small quarries throughout the region. The largest producer is the Kettle Valley Stone Company of Kelowna which sells flagstone, ashlar, facing stone and landscape rock mined from the **Nipple Mountain**, **Kettle Valley**, **Canyon** and **Gemini** quarries. The products are mainly used in high-end residential and commercial developments in the western U.S.A. and central and western Canada.

Southeast British Columbia - Major Mines

Teck Coal Limited operates five large open-pit coal mines in the Elk Valley. Projected production at the company's **Coal Mountain**, **Elkview**, **Line Creek**, **Greenhills** and **Fording River** operations is 18.3 Mt of coal, down from 22.3 Mt produced in 2008. The more northerly Fording River, Greenhills and Line creek mines are in the Elk Valley coalfield, while the Coal Mountain and Elkview mines are located in the Crowsnest coalfield. The mines employ more than 2700 people and are a major economic contributer in the region. The predominantly metallurgical coal products are shipped approximately 1200 km by rail to Vancouver for export.

There are two gypsum mines in the Southeast region. CertainTeed Gypsum Canada operates the **Elkhorn** mine east of Windermere. The Elkhorn West Extension Pit is now in production and the 2009 estimated production is 375 000 t. Georgia-Pacific Canada Inc operates the **4J** gypsum mine southeast of Canal Flats.



Photo 9. View looking north at the highwall at Teck Coal Limited's Greenhills Operations.



Photo 10. Coal has played a major economic role in the Kootenays for a long time as shown by these historic coking ovens near the community of Hosmer that are more than 100 years old.



Photo 11. Loading out at CertainTeed Gypsum Canada's Elkhorn mine. Gypsum is trucked to Invermere where it is loaded on rail cars.

Baymag Inc produces magnesite from its open-pit mine near **Mount Brussilof**, northeast of Radium.

Production in 2009 is projected to be significantly higher than in 2008. The company carried out an exploration drilling program in 2009 at nearby Struna Creek.

Silica sand is produced from quartzite by HCA Mountain Minerals (Moberly) Ltd at the **Moberly** mine and plant, north of Golden.

Southeast British Columbia – Small Mines

Roca Mines Inc's **MAX** underground molybdenum mine at Trout Lake produces at 500 tonnes-per-day on a campaign basis, and has an annual production rate of 72 000 t. In December 2009, Roca submitted an application (pre-Environmental Assessment) to expand the MAX operation to 1000 tonnes-per-day and to extend the mine life.

Imasco Minerals Inc produces a variety of crushed and ground rock products at its Creston operations plant; sources include the underground dolomite mine at **Crawford Bay** and the **Lime Creek** limestone quarry.

The **Winner** gabbro quarry west of Grand Forks supplies feed for the Roxul (West) Inc mineral wool insulation manufacturing plant in Grand Forks.

Southwest British Columbia – Major Mines

The southwest region hosts one major metal mine, a thermal coal mine, several major industrial minerals operations and some of the largest aggregate producers in Canada.

The region's metal mine, **Myra Falls Operations**, produces zinc, copper, silver and gold and currently has just over 200 employees. It is an underground operation. Early in the year it was expected to process approximately 480 000 t of ore in 2009. The 2009 production projection as of the end of the third quarter is given in Table 1. Newly discovered lenses were brought into the mine plan in 2009.

Quinsam thermal coal mine, an underground retreat room and pillar mining operation, has in recent years produced roughly half a million tonnes of thermal coal per year from seams in the Upper Cretaceous Comox Formation. It is forecast to produce approximately 390 000 t clean coal in 2009. The mine supplies Lower Mainland and US Pacific Northwest cement plants as well as the international thermal coal market through an offtake agreement with the Vitol Group. Owner Hillsborough Resources Ltd and Vitol Anker International B.V. have entered into an agreement providing for the acquisition of Hillsborough by Vitol.

Industrial Minerals operations are organized below roughly geographically, north to south and east to west. Two of the large sand and gravel producers in the southwest participate in export markets. The province's largest sand and gravel operation, the **Sechelt Mine** of



Photo 12. Molybdenite-bearing quartz vein stockworks underground at the Roca Mines Inc MAX molybdenum mine.



Photo 13. A freighter at Campbell River, loading Myra Falls Zn and Cu concentrates bound for Asia.

Lehigh Hanson Materials Ltd. is expected to produce and ship 2.9 Mt in 2009. Approximately 22% of the product goes to California. Near Port McNeill, the **Orca** quarry of Polaris Minerals Corporation mainly targets the northern California market with shipments also to the Lower Mainland and Hawaii. It will produce on the order of 1.3 Mt in 2009. Polaris has plans to enter the southern California market as well.

On Texada Island, **Blubber Bay Quarry**, a producer of limestone aggregate and dolomite is owned by Ashgrove Cement Company. At the end of the third quarter it had produced just over 207 000 t of limestone aggregate and expected to ship just over 200 000 t in 2009. The quarry also produces dolomite, approximately 13 340 t in 2009. Dolomite is shipped to Ashgrove's Rivergate lime plant in Portland, Oregon.

Texada Quarrying Ltd (local subsidiary of Lafarge North America) will mine and ship approximately 3.4 Mt in 2009 from its limestone quarry near **Gillies Bay** on Texada Island. Approximately 80% of the product is limestone used as cement feed at western North American plants. The other 20% is used as aggregate.

Imperial Limestone Company Ltd operates another limestone quarry on Texada Island, near **Van Anda**. It is expected to produce over 208 000 t in 2009. They ship to parent company J A Jack & Sons in Seattle. The product is mainly used for glass and as filler in other construction products.

Sumas Shale Ltd is expected to produce approximately 285 000 t in 2009 at its **Sumas Mountain** quarry. The large majority of the product goes to local cement plants. A smaller amount of clay product, approximately 3-4%, is used in the manufacture of bricks.



Photo 14. Imperial Limestone quarry on Texada Island with a drill located on the upper bench.

Southwest British Columbia - Small Mines

Electra Gold Ltd's **PEM 100** quarry near Apple Bay produces chalky geyserite, a silica-alumina cement feed product. The quarry is expected to produce 101 000 t in 2009. Customers include Ashgrove Cement Company and Lafarge North America.

Imasco Minerals Inc. continues to operate its **Benson Lake** white marble quarry. It produced 26 000 t in 2009. The marble is barged to the Lower Mainland and sold as fine-ground bright white calcium carbonate filler and extender.

There are several dimension stone and landscaping stone quarries in the southwest. One notable for its recent success is the **K2** located near Port Renfrew, operated by K2 Stone Inc. It has entered the western US market and increased its sales in 2009.

There are two pumice quarrying operations north of Pemberton in the **Mount Meager** area. Garibaldi Pumice Ltd's quarry is now in regular production. Great Pacific Pumice Inc resumed production in 2009. The products from both operations were used as lightweight aggregate.

MAJOR MINE DEVELOPMENT PROJECTS

The Ministry of Energy, Mines and Petroleum Resources had seven project submissions for a mine permit and the Environmental Assessment Office (EAO) listed 23 potential mine development projects as of December 2009. In addition, there are six projects that are fully permitted. A number of projects making significant progress in 2009 are noted below.

Northwest British Columbia - Major Mine Development and Evaluation Projects

The **Galore Creek** copper-gold mine development is on hold pending redesign. The project is a 50-50 partnership between Teck Corporation and NovaGold Resources Inc. A revised feasibility analysis and an amendment to its environmental certificate are required. Galore Creek is an alkalic porphyry copper deposit with measured and indicated resources of 785.7 Mt grading 0.52% Cu, 0.29 g/t Au and 4.87 g/t Ag. Construction of the access road continued in 2009. The governments of British Columbia and Canada will share the cost to build the Northwest Transmission Line, an extension of the power grid that could service new mines in the region, such as Galore Creek and KSM.

The **Red Chris** porphyry copper-gold project, owned by Imperial Metals Corporation has provincial and federal environmental assessment certificates to develop a 30 000 tonne-per-day open-pit mine. Reserves estimated in 2004 total 277.8 Mt grading 0.35% Cu and 0.27 g/t Au. Imperial Metals began application for a mine permit. The project could be serviced by building an extension from the proposed Northwest Transmission Line.

A deep drilling exploration program was conducted at Red Chris with a series of 1500 m holes to probe below the proposed open pit. An outstanding intercept returned 4.12% Cu and 8.83 g/t Au over 152.5 m. Exploration will continue in 2010 but will not deter from the immediate goal to develop the open pit mine. Other activities included a deep penetration geophysical survey and a short-hole drilling program, the 'footprints' project in conjunction with Geoscience BC.

Construction stopped at the **Tulsequah Chief** copper-zinc-silver-gold mine; the owner, Redfern Resources Ltd became bankrupt after spending \$170 million and the project assets are being sold by the Receiver. Adanac Moly Corporation was placed under



Figure 5. Major projects under consideration for mine development.

TABLE 2. SELECTED MAJOR PROJECTS UNDER CONSIDERATION FOR MINE DEVELOPMENT IN
BRITISH COLUMBIA, 2009

Project Name	Owner/Operator	Commodities
Chu	TTM Resources Inc.	Мо
Copper Mountain	Copper Mountain Mining Corporation	Cu-Au-Ag
Davidson	Thompson Creek Metals Company	Мо
EB	Western Coal Corp	Coal
Galore Creek	NovaGold Resources Inc	Cu-Au-Ag
Gething	Canadian Dehua International Mines Group Inc	Coal
Harper Creek	Yellowhead Mining Inc	Cu
Hermann	Western Coal Corp	Coal
Horizon	Peace River Coal Inc.	Coal
KSM	Seabridge Gold Inc	Au-Cu
Kitsault	Avanti Mining Inc.	Мо
Kutcho Creek	Sherwood Copper Corporation	Cu-Zn-Au-Ag
Line Creek Phase II Expansion	Teck Coal Ltd	Coal
Morrison	Pacific Booker Minerals Inc	Cu-Au
Mt. Milligan	Terrane Metals Corp	Cu-Au
Prosperity	Taseko Mines Ltd	Au-Cu
Red Chris	Imperial Metals Corporation	Cu-Au
Raven Coal	Compliance Energy Corporation	Coal
Roman Mountain	Peace River Coal Inc	Coal
Ruddock Creek	Imperial Metals Corporation	Pb- Zn
Schaft Creek	Copper Fox Metals Inc	Cu-Mo-Au-Ag
Willow Creek	Western Coal Corp	Coal



Photo 15. Red Chris: John Bellamy, Project Manager, checks progress on a drillhole in the deep copper-gold zone.

Bankruptcy Protection and the construction camp for its **Ruby Creek** molybdenum project was sold.

Seabridge Gold Inc advanced the **KSM** (**Kerr-Sulphurets-Mitchell**) porphyry gold-copper project toward a preliminary feasibility study in early 2010 and an application under the BC Environmental Assessment Act. The measured plus indicated resource in the principal Mitchell deposit is 1510 Mt grading 0.64 g/t Au and 0.18% Cu.

The KSM porphyry copper deposits are uncommonly rich in gold and are associated with sub-alkalic intrusions. The Mitchell zone is a deformed quartz stockwork exposed in an erosional window below a thrust fault, which truncates part of the deposit. Uniform gold grade is an important attribute.

There was little fieldwork on the **Kutcho Creek** copper-zinc project by Capstone Mining Corporation. The volcanogenic massive sulphide project continues in the pre-application stage of Environmental Assessment. Revised mineral resources, focused on the higher grade



Photo 16. Mike Savell standing on the Mitchell gold-copper zone of KSM. He received the Spud Huestis award in 2009 for his work at KSM, in particular the Mitchell zone.

areas of the deposit, comprise 10 415 000 t in the measured and indicated categories grading 2.14% Cu, 2.85% Zn, 32.4 g/t Ag and 0.36 g/t Au. A preliminary economic assessment scaled down the proposed mine to 2500 tonnes-per-day at a capital cost of \$133.5 million.

The **Schaft Creek** porphyry copper project of Copper Fox Metals Inc. continued in the pre-application stage of the environmental assessment process for a proposed 100 000 tonne-per-day open-pit mine. There was little activity in 2009. Measured and indicated open pit resources total 812 Mt grading 0.30% Cu, 0.020% Mo and 0.21 g/t Au.

Kitsault is a closed open pit molybdenum mine that Avanti Mining Inc proposes to re-open. The project has a Mines Act permit but requires an amendment for a new mill and tailings impoundment. Work in 2009 focused on geotechnical drilling for the new facilities. A prefeasibility study was completed for a 40 000 tonneper-day operation and estimated a capital cost of \$US641 million. Proven and probable reserves total 215.3 Mt grading 0.085% Mo, revised from historic data following a major drilling program in 2008.

Thompson Creek Metals Company submitted an Environmental Assessment project report for the **Davidson** underground molybdenum project. Some 2000 tonnes-per-day of high-grade ore would be shipped to Endako Mine for processing in a separate circuit. The Davidson porphyry molybdenum deposit contains 75.3 Mt grading 0.177% Mo (measured plus indicated resource).

Pacific Booker Minerals Inc. is in the pre-application stage of the Environmental Assessment process for the **Morrison** copper-gold project, a proposed 30 000 tonneper-day open-pit mine. The porphyry copper deposit has a measured plus indicated resource of 206.9 Mt grading 0.39% Cu, 0.20 g/t Au and 0.005% Mo.

Northeast British Columbia - Major Mine Development and Evaluation Projects

Western Coal Corp began stripping operations again at **Willow Creek** in October 2008 only to suspend them at the end of November, 2008 with no production. In 2009, nine staff were on site as the mine continued under care and maintenance. In 2009, WCC continued an onlease drilling program to define better the coal resource in the North Zone and conducted condemnation drilling for a potential waste rock site west of the north property adjacent to North Zone coal resources. Total *in situ* measured and indicated resources, as of April 2009, stood at 36.0 Mt.

The **EB** and **Hermann** deposits, near the Perry Creek (Wolverine) mine have a total of 42.4 Mt of reserves. The Hermann deposit has an EA certificate in place and WCC plans for the deposits to supplement production at Perry Creek, increasing total capacity to 3 Mt/a, which would



Photo 17. Jay Fredericks, Director of the BC Mineral Development Office, holds up a piece of coal at the Willow Creek project.

equal the capacity of the preparation plant.

During 2009, PRC continued the development process for its **Roman Mountain** project, located adjacent to the Trend mine, with submission of an application to the Environmental Assessment Office anticipated. About 30 Mt of coal has been identified in the Roman Mountain deposit. Production from PRC's Trend mine is expected to increase to a total of 3 Mt/a by 2013 as this deposit is added to production.

North-Central British Columbia - Major Mine Development and Evaluation Projects

Terrane Metals Corporation prepared a feasibility update for development of the **Mt. Milligan** copper-gold deposit. The project has provincial and federal environmental assessment certificates to build a 60 000 t per day open pit mine. Proven and probable ore reserves at the porphyry copper-gold deposit are 482 Mt grading 0.20% Cu and 0.39 g/t Au. Capital cost is estimated to be \$915 million. To assist in financing the mine, Terrane Metals and Goldcorp Inc. (majority owner of Terrane) signed an option agreement whereby Goldcorp may convert its equity interest in Terrane into a participating joint venture in the Mt. Milligan project. The deadline for Goldcrop to exercise this option is early in 2010.



Photo 18. Terrane Metals' Mt. Milligan Project. The topography makes this deposit very amenable to open pit mining.

The **Chu** molybdenum project entered the BC environmental assessment process but TTM Resources Inc conducted little fieldwork on the property due to tight financing, particularly for molybdenum projects. Measured plus indicated resources are estimated at 313.25 Mt grading 0.060% Mo. The deposit is developed where a swarm of granodiorite dikes intrude sedimentary and volcanic rocks.

At the **Bonanza Ledge** mesothermal gold project, International Wayside Gold Mines Ltd conducted mechanical trenching and drilling with the objective to upgrade inferred gold resources to measured and indicated categories. Resources on the property comprise 264 264 t averaging 6.51 g/t Au (measured), 193 086 t averaging 4.46 g/t Au (indicated) and 206 742 t averaging 3.77 g/t Au (inferred). International Wayside reported a pre-feasibility study for a 200 t per day open-pit mine.

South-Central British Columbia - Major Mine Development and Evaluation Projects

The development of the **New Afton** mine of New Gold Inc continues on a schedule which should see production in 2012. The mill building is complete and some mill components have been installed. Much of the work at the site was conducted underground where development drifts to the base of the ore body were completed and the conveyor decline was significantly advanced. Capital expenditures on the project are estimated at \$66 million for the year, and the company reports an additional \$355 million will be required to bring the mine into full production. The company has been actively working on updating its resources for the property which may include some of the deeper intersections drilled beneath the currently blocked out reserves.



Photo 19. The completed mill building at New Gold Inc's New Afton mine development site as seen from the Trans Canada Highway.



Photo 20. Core sample of high-grade, deep mineralization at the New Afton project which may bolster currently outlined resources in an update currently underway.

The Copper Mountain project of Copper Mountain Mining Corporation and Mitsubishi Materials Corporation is advancing quickly. The project is planned to involve the development of a super pit which incorporates three former pits and the construction of a new 35 000 t per day mill. The company reports an increase in its proven and probable reserves to 211 Mt of 0.36% Cu and anticipated gold and silver credits. Pouring of the new mill building foundations has begun and the erection of the building will commence next spring. The company has ordered equipment in anticipation of pre-mining stripping in 2010. Capital expenditures this year are likely to be over \$50 million and the company estimates the total cost of the project will be \$437 million. The project continues in the Mine Development Review Process for a final permit amendment.

Southeast British Columbia - Major Mine Development and Evaluation Projects

Significant mine development and evaluation projects in southeast British Columbia were mainly limited to Teck Coal Limited's **Line Creek** Operations. At the MSA West Extension Pit the company constructed benches and carried out rotary drilling in advance of production. Baseline environmental studies related to the Line Creek Phase II Expansion Project were carried out. The expansion, which encompasses Mount Michael and Burnt Ridge North, will extend production activities to the north



Photo 21. Foundations being poured this fall will allow the construction of a new mill building at the Copper Mountain mine development to begin in the spring of 2010 (photo courtesy of Copper Mountain Mining Corporation).



Photo 22. View looking north of rotary drilling at the north end of Teck Coal Limited's Mount Michael property.

of current active pits. The Phase II Expansion Project entered the Environmental Assessment Process in 2009.

Southwest British Columbia - Major Mine Development and Evaluation Projects

The **Raven Coal** project entered the environmental assessment process in 2009. It is operated by a joint venture led by Compliance Energy Corporation with partners Itochu Corporation and LG International. Concurrent with infill drilling to upgrade resources were initiation of environmental baseline monitoring and initiation of a full feasibility study. Under consideration is an underground metallurgical coal mine. The feasibility study will also consider several options for transporting coal from the site to local port facilities.



Photo 23. Driving in casing for a drillhole on the Raven coal project.

SMALL MINE DEVELOPMENT PROJECTS

Hawthorne Gold Corporation began development while continuing exploration at the **Cassiar** gold project.

The site includes underground workings at the Table Mountain mine and a 270 tonne-per-day mill, which requires restoration. An underground ramp will access a small gold resource in the East Bain vein. To augment the ore supply, a bulk sample was extracted by surface mining at Taurus and stockpiled at the mill. An aggressive exploration drilling program tested other veins.

The **Yellowjacket** mine, operated by Eagle Plains Resources Ltd, began production at a target rate of 350 t per day, after successful pilot milling in 2008. Little gold was produced as a result of mechanical and electrical breakdowns.

Metal Mountain Resources Inc, a private company, applied to re-open the **Dome Mountain** underground gold mine. Dome produced 360 kg Au (11 600 oz) from 31 000 t of ore in the early 1990s. Drilling in 2009 focused on confirmation of proven and probable reserves that remained when the mine closed, of 181 780 t grading 14.9 g/t Au. Ore would be shipped off-site for custom milling.

First Coal was particularly active on its **Goodrich Central South** project east of Chetwynd, obtaining permits necessary for taking a 100 000 t bulk sample in 2010 and moving the components for the Addcar mining system onto the site. A resource estimate released in May 2009 indicated 15.5 Mt measured, 27.9 Mt indicated, and 35.4 Mt of inferred resources.



Photo 24. Yellowjacket: Geologist Chuck Downie supervised operations at this new, small gold mine development project near Atlin.



Photo 25. Exposed coal seam in trenching at First Coal Corporation's Goodrich Central South Project.

MINERAL EXPLORATION

Exploration spending fell well short of last year's level of \$367 million. But a rally late in 2009 resulted in higher expenditures than first anticipated given the challenging financial environment that many junior companies experienced in late 2008 and early 2009. At \$154 million, the 2009 figure is the sixth largest provincial expenditure in the last 20 years. There were 23 mineral discoveries reported in 2009. Most of the discoveries were for base and precious metals, but new finds included REEs and tungsten.

Northwest British Columbia - Major Exploration Projects

At the **Atlin Gold** project, Blind Creek Resources Ltd drilled in the heart of the placer district for auriferous quartz veins associated with carbonate (listwanite) alteration of ultramafic rocks. Troymet Exploration Corporation discovered a promising structural zone on its



Figure 6. Distribution of mineral exploration spending in British Columbia, 2009.

Golden Eagle gold project northwest of Atlin. In the Cassiar area Velocity Minerals Ltd reopened an adit on the **Cassiar Moly** prospect to conduct underground sampling.

Northeast of Dease Lake, the **Nizi** gold prospect was explored by Solomon Resources Limited; the Discovery "vein" is a microcrystalline quartz stockwork containing gold and silver. Hard Creek Nickel Corporation contracted Norilsk Process Technology to determine the viability of its patented hydrometallurgical process to extract nickel and cobalt on the **Turnagain** property. Measured plus indicated resources are estimated at 695 Mt at a grade of 0.174% Ni and 0.014% Co (as sulphide minerals); total Ni content is about 0.22%.

Skyline Gold Corporation reactivated its **Bronson Slope** porphyry copper-gold project near the closed Snip gold mine. Two drillholes in a new zone intersected visible gold; the best interval graded 4.36 g/t Au, 75.9 g/t Ag, 0.13% Cu and 1.15% Zn over 27.0 m. The Bronson Slope deposit contains a measured plus indicated resource of 225.1 Mt grading 0.36 g/t Au and 0.14% Cu. The deposit is a quartz-magnetite replacement and stockwork



Photo 26. Cassiar Moly, portal location in the rugged Cassiar Mountains.

zone at the top of syenite stock. Pacific North West Capital drilled on the nearby **Rock & Roll** volcanogenic massive sulphide prospect which has an inferred historic resource of 580 044 t grading 2.4 g/t Au, 335.9 g/t Ag, 0.64% Cu, 0.79% Pb and 3.1% Zn. To the north near Galore Creek, Romios Gold Resources Inc drilled the **Trek** property.

At the **Snowfield** property Silver Standard Resources Inc. mobilized 7 drills for the largest exploration program in the Province. Snowfield adjoins KSM to the east. At Snowfield North, resource definition drilling increased measured and indicated resources to 847.1 Mt grading 0.72 g/t Au, 0.12% Cu and 92 ppm Mo. The Snowfield North zone is likely related to the similar Mitchell porphyry deposit located 2 km west on the KSM property. At Brucejack, encouraging results from 'new' zones quickly converted Silver Standard's drilling program from exploration to resource definition. A Bridge zone hole returned 0.87 g/t Au over 552 m. The Brucejack area was explored intensively between 1980 until 1994 and historic holes were also used to determine a measured plus indicated resource of 120.5 Mt grading 1.04 g/t Au and 16.9 g/t Ag. Epithermal vein and stockwork zones formed in volcanic rocks outboard of coeval high-level intrusions. Drilling was conducted at Mount Dunn by Paget Minerals Corporation.



Photo 27. Snowfield: Geologists examine rock textures in the Snowfield gold-molybdenum zone.

In the Stewart area, American Creek Resources completed 9520 m of drilling at **Treaty Creek** to explore epithermal gold vein and massive sulphide (Eskay Creek-type) targets. The **Premier Gold** property was optioned by Ascot Resources Ltd, which completed 7500 m of drilling, mainly on zones in the northern part of the property that had been explored previously only to shallow depth. Decade Resources Ltd drilled the Montrose gold-copper zone on the **Red Cliff** property. High grade intercepts from the past-producer sparked late-season interest.

Further south on the **Homestake Ridge** gold-silver prospect, Bravo Venture Group Inc. focused its 13 000 m



Figure 7. Selected major exploration projects in British Columbia, 2009.



Figure 8. Mineral discoveries in British Columbia 2009 (includes 2008 discoveries reported in 2009).





TABLE 3. MINERAL DISCOVERIES 2009

Property	Zone/Prospect/Description	Discovery Year	Location (1:20K Mapsheet)	Operator/Organization	Туре	Commodities
Ample-Goldmax	Step out drilling defines new	2008	092J.070	Supreme Resources Ltd.	Vein / Breccia	Au, Ag
Blackwater- Davidson	Continuity between zones (new bulk tonnage target)	2009	093F.016	Richfield Ventures Corp	Epithermal breccia	Au
Bonanza Ledge	Cow Mountain, Bonanza Ledge	2009	093H.003	International Wayside Gold Mines Ltd	Vein	Au
Bralorne Gold Mine	Three new veins within BK zone	2009	092J.076	Bralorne Gold Mines Ltd.	Vein / Breccia	Au, Ag
Bridge River	Extension to BR zone	2009	092J.093	Cresval Capital Corp	Porphyry	Cu, Mo, Au
Bronson Slope	CE zone	2009	104B.065	Skyline Gold Corp	Porphyry-related vein	Au
Jersey-Emerald	Lost Creek	2008	082F.004	Sultan Minerals Inc	Skarn	W, Zn
Knight Inlet	Stafford Lake showing	2009	092K.073	Dentonia Resources Ltd	Skarn	W
Logan Copper	Blue, Midway and Cliff showings found by MMI soil sampling, prospecting and mapping	2009	0921.047	SNL Enterprises Ltd.	Porphyry	Cu, Mo, Ag
Midday	Longspur showing	2009	082M.003	Tom Robinson	Massive Sulphide	Zn, Pb, Cu, Au, Ag
Mineral Creek	HW-1 vein	2009	092F.017	Bitterroot Resources Ltd	Vein	Au
Mission North	lain's Glory vein	2009	092G.039	Chai Cha Na Mining Inc	Vein	Au
Mount Polley	WX zone	2009	093A.052	Imperial Metals Corporation	Porphyry	Cu, Au
Myra Falls	South Flank and RE-108 lenses	2009	092F.053	Breakwater Resources Ltd	Massive Sulphide	Zn, Cu, Au, Ag
Red Cliff	Montrose zone	2009	104A.001/01 1	Decade Resources Ltd	Vein	Au
Rogers Creek	Target 4	2009	092G.099	Wallbridge Mining Company Limited	Porphyry	Cu,Mo,Au
Silver King	New vein system	2009	082F.044	Excalibur Resources Ltd	Vein	Ag, Au, Cu, Zn, Pb
Snowfield- Brucejack	Bridge zone	2009	104B.050	Silver Standard Resources Inc	Porphyry-related	Au
Spanish Creek	Thunder Ridge	2008	092P.098	Skygold Ventures Ltd	Vein	Au
Stellar	Hammer zone	2008	082M.031	Tom McDonald and Alfie McKay	Massive Sulphide	Zn, Pb, Cu, Au, Ag
Teddy Glacier	New vein extension on Vimy Ridge	2009	082K.082	Jazz Resources Inc	Vein	Au, Ag, Pb, Zn, Cu
West Valley	NTP zone - high grade grab samples	2009	0921.036	Happy Creek Minerals Ltd.	Porphyry	Cu, Mo
Wicheeda	Main Zone	2008	093J.060	Spectrum Mining Corp	Carbonatite	REE (Ce, La, Nd)
NTS 083D/06	outcrop discovery, significant exposure	2009	083D.025	British Columbia Geological Survey	Industrial mineral	vermiculite
Harrison Creek Occurrence	new mapping find	2008	093A.004	British Columbia Geological Survey	Porphyry	Cu,Au
Fit Showing	new mapping find	2008	093C.029	British Columbia Geological Survey	Porphyry?	Cu, Ag
Ejowra showing	new mapping find	2008	093C.019	British Columbia Geological Survey	Unknown	Cu, Ag
ET	new mapping find	2008	093C.020	British Columbia Geological Survey	Vein	Cu, Ag, Au

drilling program on the Homestake Silver zone. Inferred resources in the Main zone stand at 2.3 Mt grading 7.53 g/t Au, 31 g/t Ag and 0.27% Cu. An update will incorporate data from drilling in 2008 and 2009. AngloGold Ashanti Holdings PLC acquired an option on the **Big Bulk** prospect, where three 700 m holes were drilled to test a strong, deep IP anomaly.

On the **Terrace** property, Argonaut Resources completed 11 drillholes on a series of base and precious metal quartz veins related to granitic intrusions. Eastfield Resources Ltd. drilled the nearby **Zymo** project.

A grassroots drilling program was conducted at **Turkey Mountain** in the Babine district on a target derived from the Quest West geophysical survey.

Among molybdenum projects, Bard Ventures disclosed a measured and indicated resource for its **Lone Pine** property near Houston of 110.34 Mt averaging 0.083% Mo. Much of the resource is located more than 300 m below surface. Consequently Bard re-focused on a new target area and began drilling late in the year.

South of Smithers, the **Deer Horn** gold-silver prospect was explored by Golden Odyssey Mining Inc. Core drilling tested a historic unclassified resource of 249 000 t grading 10.1 g/t Au and 294 g/t Ag; extraction of a bulk sample is being considered in 2010. At the **Poplar** copper-molybdenum prospect, Lions Gate Metals Inc. completed a gradient IP survey in preparation for drilling in 2010.



Photo 28. Deer Horn: Harry Huffels and Cody Philpott at the adit and collapsed 1989-1990 drill core; the moderately dipping quartz-gold vein is visible above the portal.

Northeast British Columbia - Major Exploration Projects

Canadian Dehua International Mines Group Inc completed 14 drillholes with a total of approximately 11 200 m to further define the resources at its **Gething** property in 2009. The **Highhat** project, operated by Trefi Coal Corp, was also the site of drilling activity in 2009, and a NI 43-101 statement was issued that estimated measured and indicated reserves of 39 Mt and resources of nearly 91 Mt.

The Belcourt-Saxon Coal Limited Partnership, a 50/50 joint venture of PRC with WCC, undertook a fivehole drill project comprising approximately 1000 m on the **Belcourt West** project, resulting in filing a NI 43-101 statement that indicated 86 Mt of proven reserves, 167 Mt of measured and a further 4 Mt of indicated resources.

North-Central British Columbia - Major Exploration Projects

The **Nonda** property near the Yukon border was acquired by Stikine Gold Corporation as a potential source of high-quality silica. The material has potential use in the new Horn River gas field to enhance recovery by hydro-fracturing the reservoir rock. Nine holes were drilled into Nonda Formation quartzite.

A regional program by Canada Zinc Metals resulted in discovery of two new showings in the highly prospective Gunsteel Formation. **Akie** has an inferred resource of 23.6 Mt grading 7.6% Zn, 1.5% Pb and 13 g/t Ag. The **Cirque** sedex deposit, also in the Gunsteel Formation, has a geological resource of 38.5 Mt grading 8.0% Zn, 2.2% Pb and 47 g/t Ag that dates from 1986 and is not NI 43-101 compliant. Joint venture partners Teck Corporation and Korea Zinc Company Ltd deferred a planned drilling program until 2010.

The focus of exploration activity in North Central region was in the Quesnel terrane (trough) for porphyry copper-gold deposits related to both alkali and calcalkalic intrusions. In addition to a major program at Mount Polley, described in a preceding section, large programs were conducted at (from north to south) Pine, Kwanika and Woodjam.

Gold Fields Toodoggone Exploration Corp acquired the **Pine** porphyry copper-gold property, located north of the Kemess mine. Their program included a low-level airborne magnetic survey, a 420-km IP and gravity grid; they planned to complete 4000 m of core drilling.

At the **Kwanika** copper-gold project, Serengeti Resources Inc announced an indicated resource in the Central zone of 182.6 Mt grading 0.29% Cu and 0.28 g/t Au. Drilling in 2009 identified the West fault, a structurally controlled mineralized zone which, defined by seven holes, is 350 m long by 500 m in depth and has an average drill intercept width of 126.6 m grading 0.41% Cu, 0.09 g/t Au and 0.022% Mo. This newly recognized structure has an untested target length of 2.3 km. The **Tchentlo-Indata** area in the southern portion of the Kwanika property was explored by six shallow holes but only trace mineralization was found.

Gold Fields Limited optioned the **Woodjam North** copper-gold property and conducted a comprehensive program that included about 6000 m of core drilling. Rocks on the property comprise diorite to monzonite of

the Upper Triassic Takomkane batholith and coeval mafic volcanic rocks of the Takla Group. A 75 km induced polarization survey focused on an area north of the Megabuck and Deerhorn zones and a low-level airborne magnetic and radiometric survey was flown over the entire property. Drilling planned to test new targets and the Takom and Deerhorn zones.

Other significant projects in the Quesnel trough include **Pinchi** (by Amarc Resources Ltd) and **Osilinka** and the **Choo** and **Mil** properties (by Serengeti Resources Inc). Generally, drilling explored coincident magnetic and induced polarization anomalies in areas of poor rock exposure, in some cases supported by a geochemical anomaly.

Alpha Gold Corporation conducted a drilling program on its **Lustdust** gold project where gold occurs with copper and other base metals in skarn and manto zones. The program comprised in-fill holes in the Canyon Creek zone, tested for a northern extension and replicated historical holes that had not been surveyed.

The **Bodine** copper-zinc project of Amarc Resources Ltd. is in the Sitlika belt of volcanic rocks to the northwest of the Osilinka project. Drilling targeted a volcanogenic massive sulphide deposit within a thick sequence of felsic volcanic rocks and tested down dip of previous holes that intersected stringer-style mineralization with anomalous zinc and copper.

Exploration success on the **Wicheeda** rare earth elements (REE) project near Prince George stimulated interest in carbonatites along the Rocky Mountain Trench. Spectrum Mining Corporation, a private company, drill-tested bodies of intrusive carbonatite and syenite breccia. Significant REE values were intersected in all 11 holes, for example, 1.3% Ce, 0.64% La and 0.26% Nd over 144 m. The carbonatite consists mainly of dolomite-ankerite and the breccia comprises syenite clasts in a carbonatite matrix. Minor constituents of the carbonatite include pyrochlore, columbite, monazite and a bastnaesite-synchisite-parasite mineral; the latter two are enriched in rare earths.

Richfield Ventures Corp acquired the Blackwater-Davidson epithermal gold property on the Nechako plateau. Success from initial drilling led to a second phase program; intercepts include 1.26 g/t Au over 148 m in one hole and 1.06 g/t Au over 207 m from another. Siliceous breccia, accompanied by base metal sulphides, is developed in felsic volcanic interpreted to be a rhyolite dome. On the nearby Capoose-Silver Trend project, Silver Quest Resources Ltd drilled zones of disseminated silver and gold mineralization in the vicinity of the Capoose deposit. The historic resource (not NI 43-101 compliant) is estimated at 28.2 Mt grading 36.0 g/t Ag and 0.34 g/t Au. Drillhole D-09-100 intersected two zones; an upper zone graded 67.9 g/t Ag and 0.26 g/t Au across 16 m and a second zone, 29 m deeper in the hole, graded 61.8 g/t Ag and 4.72 g/t Au over 9.0 m.

Endurance Gold Corporation completed a modest drilling program on the **Nechako** Gold property located west of Quesnel. Widespread low grade gold is associated with hematite alteration in chert pebble conglomerate and may be related to rhyolite dikes.

On the **Spanish Mountain** gold project, Skygold Ventures Ltd conducted in-fill drilling on its Main zone gold resource and drill-tested regional targets. Measured plus indicated resources stand at 102.26 Mt averaging 0.785 g/t Au. The program sought to define an area near surface that contains higher gold grade. Gold occurs with disseminated pyrite and in quartz veinlets developed in folded argillaceous sedimentary rocks.



Photo 29. Drill core grading 33 g/t Au, Main Zone, Spanish Mountain.

South-Central British Columbia - Major Exploration Projects

At the Lac La Hache porphyry copper-gold property, GWR Resources Inc drill tested the Aurizon South zone after re-logging previous years' core and geophysical and geochemical information yielded new exploration targets. Skygold Ventures Ltd drilled the Spanish Creek property northeast of Canim Lake this year in search for gold in a similar geological setting to its flagship Spanish Mountain property.

The **Prosperity** gold-copper porphyry deposit of Taseko Mines Ltd continues in the provincial and federal environmental assessment process with recommendations anticipated in early 2010. The company restated its proven and probable reserves in November to now include a markedly larger 831 Mt of 0.23% Cu and 0.41 g/t Au. Amarc Resources Ltd drilled the **Newton Mountain** property located west of Williams Lake. Early reports are that a significant discovery has been made with vertical hole 9004 cutting 189 m of mineralization that graded 1.56 g/t Au, 7.9 g/t Ag, 0.08% Cu and 0.17% Zn starting at a core depth of 6 m.

Barrick Gold Corporation was active at the **Yalakom** Project where it upgraded the geological understanding on the Poison Mountain deposit and analytical results from previous work. The company completed a drill program as well as geological and geochemical work.

The **Blackdome** epithermal gold-silver mine and mill of Sona Resources Corp (J-Pacific Gold Corp) is located northwest of Clinton and remains on care and maintenance. Nearby the company also holds the **Elizabeth** property which hosts high-grade mesothermal gold veins. The company is proceeding with a preliminary economic assessment of both projects which contemplates underground mining of resources and the transport of Elizabeth ore to the Blackdome mill for processing.

In the famous Gold Bridge mesothermal gold-quartz vein camp, Bralorne Gold Mines Ltd was busy at the **Bralorne** mine with work on the BK Zone and other veins at the property in a concerted effort to harbor sufficient resources to resume mining. Two declines were started to access the gold-bearing veins and provide a better indication of their grade and continuity. Ongoing surface drilling at the property continues to test structures for vein potential.

At the **Blue River** tantalum and niobium project, Commerce Resources Corp reported a new resource estimate for the Upper Fir deposit that included an indicated resource of 11.31 Mt at 198 g/t Ta_2O_5 and 1 170 g/t Nb₂O₅ and inferred resource of 26.24 Mt of 194 g/t Ta_2O_5 and 1 182 g/t Nb₂O₅ at a 150 g/t Ta_2O_5 cut-off. A drill program was completed this year at the Upper Fir to infill geological and mineralogical gaps and another resource update is anticipated. The company is progressing on a preliminary economic evaluation and undertaking further engineering investigations and metallurgical test work.

Selkirk Metals Corp (now Imperial Metals Corporation) released a resource estimate for its **Ruddock Creek** project located north of Revelstoke. The E zone contains an indicated resource of 2.3 Mt of 7.8% Zn and 1.6% Pb and an inferred resource of 1.5 Mt of 6.5% Zn and 1.3% Pb, both at a cut-off of 4% combined Pb plus Zn. Numerous other zones exist on the property that require further testing. Armadillo Resources Ltd completed a drill program this year at the **Waverley-Tangier** property located northeast of Revelstoke where replacement zinc-lead-copper mineralization is hosted within metasediments.

At the **Harper Creek** copper project located near Vavenby, Yellowhead Mining Inc has outlined an extensive volcanogenic massive sulphide system with an indicated resource of 538.4 Mt of 0.32% Cu at a 0.2% cut-off. This year the company undertook office-based studies aimed organizing data and characterizing the deposit as well as gathering environmental baseline data in preparation for a feasibility study. The project entered the pre-application phase of the EA process in September 2008. On the **Moore** property south of the Harper Creek project, Almo Capital Corp completed a drill program also in search of volcanogenic massive sulphide



Photo 30. The E zone in outcrop at the Ruddock Creek property of Imperial Metals Corporation.

mineralization within rocks of the Eagle Bay Assemblage.

At the **Windpass** property, east of Little Fort, Molycor Gold Corp trenched and drilled at the former gold-silver-copper producer.

American Creek Resources Ltd drilled its **Iron Mist** property located north of Kamloops. At the property the company is evaluating the iron content of what may be a magnetite skarn and reports success in intercepting magnetite-rich zones in all holes completed. Encore Renaissance Resources Corp is bulk sampling highgraded quartz vein material from its **Bonaparte Gold** property located north of Kamloops. The objective is to ship the materials to the Kinross mill in Washington State for processing and recovery of precious metal.

Abacus Mining and Exploration Corp. has completed a preliminary economic assessment of the **Ajax** coppergold porphyry deposit near Kamloops which encompasses the former producing Ajax pits of the Afton mine. The study contemplates a 60 000 tonnes-per-day operation exploiting the measured and indicated resource of 442 Mt of 0.30% Cu and 0.19 g/t Au.

Happy Creek Minerals Ltd drilled the **Rateria** porphyry copper-molybdenum property, located southeast



Photo 31. A trench at Molycor Gold Corp's Windpass property near Little Fort.



Photo 32. The start of a portal to exploit the Jewelry Box vein at the Bonaparte Gold property of Encore Renaissance Resources Corp north of Kamloops.

of the Highland Valley mine. Last year the company reported very positive drill results from Zone 2 at the property and this year tested expansions of the zone. SNL Enterprises Ltd drilled at the **Logan Copper** project located east of the Highland Valley Copper mine. Last year's drilling at the Dansey property produced some long intersections of shallow mineralization (within 8 m of the top of the hole).

Almaden Minerals Ltd continues to evaluate the Elk



Photo 33. Bob Friesen of Abacus Mining and Exploration Corp explaining the geology of the Ajax pits to a group representing the Japan Oil, Gas and Metals National Corporation and other companies with interests in the BC mining industry.

mesothermal gold-quartz vein project between Merritt and Peachland. The company has generated a new geological model for the deposit and incorporated 2007 drilling into a new resource estimate for the property. It also is undertaking further scoping studies in support of the resumption of mining.

Partners Molycor Gold Corp and Goldrea Resources Corp drilled the **Flap** gold project located northwest of Kelowna. Previous work on the property in the late 1980s yielded erratic grades of gold mineralization within a quartz stockwork and the company hopes better drilling techniques will overcome this.

Sego Resources Inc was active at its **Miner Mountain** property located northeast of Princeton where it completed a deep penetrating induced polarization and resistivity survey and trenching of priority targets. The company reports it has expanded the gold-enriched south zone where copper-gold mineralization is generally hosted within microdiorite of the Nicola Group. Supreme Resources Ltd completed an induced polarization survey at its **Tas** property located near the Copper Mountain project. Buoyed by the results of the survey the company has initiated a drill program at the property.

Southwest of the village of Tulameen, Huldra Silver Inc has made an application for a small mine permit at the **Treasure Mountain** vein silver-lead-zinc project. A conceptual underground mine of 135 t per day operating on a seasonal basis and on site gravity concentration is proposed.

Goldcliff Resources Corp got a late start at its **Panorama Ridge** gold skarn project near the historic Nickel Plate gold mine at Hedley. The company reports a regional scale, northeast trending structure is indicated in its recently completed airborne geophysical survey which it believes may be fundamentally related to gold mineralization at the Panorama Ridge property and greater Nickel Plate camp.



Photo 34. A Quantec Titan-25 deep penetrating IP survey set up at the Miner Mountain project just north of Princeton (photo courtesy of Sego Resources Inc).

Southeast British Columbia -Major Exploration Projects

The Slocan Silver project, east of New Denver, is in a rich past-producing district of vein-style silver-lead-zinc mineralization. Klondike Silver Corp's holdings are divided into several areas, including Sandon, Hewitt-Van Roi, Silverton Creek, Cody Creek, Payne and Jackson Basin. The overall objective is to discover new lodes or extensions of known occurrences. Activities included prospecting, geological mapping, geophysics, rock and soil geochemistry, trenching, drilling, and underground rehabilitation, development, drilling and test mining. Underground work took place at the Silvana and Wonderful mines, both past-producers in the Sandon area. The Silvana mill at Sandon, a 100 t-per-day concentrator, is operational and is processing ore. Concentrates from the mill are shipped to a smelter for refining.

Grizzly Diamonds Ltd's extensive **Greenwood Gold** Project was active for the second year. There are varying types of mineralization, including veins, skarns and intrusion-related. Work in 2009 included an AeroTEM III survey of the Rock Creek and Sidley-Dayton properties. Ground geophysics and initial drilling were concentrated mainly on the **Lawless** and **Ket 28** showings in the Rock Creek area.

West High Yield (W.H.Y.) Resources Ltd carried out diamond drilling on its **Rossland** property on the outskirts of Rossland. Past gold producers include the **Midnight**, **OK** and **IXL**. The property is also being evaluated for its magnesium and nickel potential. The major effort in 2009 was focused on the **Midnight** Crown Grant, specifically 3000 m of close-spaced diamond drilling in preparation for a gold resource estimate.

Jaxon Minerals Inc's **Nox Fort** property is an intrusion-related gold prospect with bismuth and tellurium located about 15 km southwest of Salmo. Known



Photo 35. Sandon: Klondike Silver Corp's 100 tonne-per-day operating mill at Sandon, part of the Slocan Silver Project.

mineralization on the property includes the Bunker Hill mine, a minor past producer of gold with tungsten, silver, molybdenum and zinc. The company believes that mineralization on the property represents a reduced, intrusion-related gold system, perhaps analogous to deposits in the Tintina gold belt. Drilling in 2009 totalled 2700 m.

The **Jersey-Emerald** property, 10 km south of Salmo, is host to tungsten, lead-zinc, molybdenum and gold mineralization. The underground **Jersey** lead-zinc and **Emerald** tungsten mines closed in 1973. Work in 2009 included surface diamond drilling programs designed to test new acquisitions and recent discoveries of tungsten and zinc. An updated resource calculation outlined 2.719 Mt measured-plus-indicated resources averaging 0.341 % WO₃, at a 0.15% cut-off, mainly in the area of old workings. Drilling for tungsten in 2009 focused on outlying areas. Results suggest there is a tungsten-mineralized corridor up to 7 km in length, as well as the potential for a high-grade tungsten resource on the **Victory** property.

Duncastle Gold Corp carried out a third diamond drilling program on the **Yankee-Dundee** property near Ymir. The property includes the **Yankee Girl** and **Dundee** past producers, which produced gold, silver, lead and zinc from polymetallic veins. The objective of the current exploration program is to identify extensions of worked high-grade material. The Yukon ore shoot, an enriched lens within the Yankee Girl structure, and also the thickest and most continuous portion of the vein, was a major focus in 2009. Drill results extended known mineralization in the Yukon ore shoot and indicate potential for resources accessible to underground mining.

Anglo Swiss Resources Inc was very active on its **Kenville Gold Mine** property, roughly 6 km west of Nelson. Historical production averaged more than 17 g/t Au from a series of thin quartz veins. Work included underground rehabilitation, mapping, sampling and diamond drilling, as well as surface diamond drilling. The expanded and refurbished 200 tonne-per-day mill was



Photo 36. View to the south along the Salmo River valley from Duncastle Gold Corp's Yankee-Dundee property.

expected to be ready before the end of the year. A metallurgical study was completed this year, as well as a resource estimate of the 257 level of the old workings. The latter outlined 24 624 t grading 20.58 g/t Au in the measured and indicated categories, and 522 000 t grading 23.01 g/t Au in the inferred category.

Spectrum Mining Corporation carried out a diamonddrilling program on the **Rock Canyon Creek** fluorite-rare earth element-niobium prospect 48 km east of Canal Flats in the White River drainage. Mineralization is believed to be related to a buried carbonatite intrusion, and is known to occur over a strike length of more than 4 km.

The **Kimberley Gold Trend**, or KAT, is a newlydeveloped geological concept intended to encompass a number of predominantly vein-hosted showings and prospects held by Ruby Red Resources Inc and others in the Cranbrook-Kimberley area. Overall the KAT represents a belt 30 km wide by more than 100 km long which cross-cuts the southern Purcell Mountains and terminates in the Rocky Mountains to the east. The main effort in 2009 was on the **Spirit Dream** gold property in the Wildhorse River area, where Ruby Red Resources carried out a trenching and detailed mapping program.

Teck Coal Limited Line Creek Operations carried out rotary fill-in drilling on the **Mount Michael** property, 3 km north of the **Line Creek mine**. This is within the proposed Phase II Expansion Project area. Teck Coal's Elkview Operations drilled at several sites, including **Baldy Ridge**, in the immediate area of the current mine. Baldy Ridge is anticipated to be the next expansion area for Elkview Operations. A mine permit application is anticipated in 2010.

At the **Crowsnest** property on Trachyte Ridge approximately 50 km southeast of Fernie in the Flathead River valley, MAX Resource Corp carried out a trenching, sampling and reverse-circulation drill program. The focus was on the discovery trench area, and the objective was to outline the known high-grade mineralization and to define and extend the mineralized structure. Mineralization may be analogous to the Cripple Creek deposit.

Southwest British Columbia -Major Exploration Projects

Results of a late 2008 drill program on the properties at **Hushamu** and **NW Expo** were encouraging. The operator is now Kobex Minerals Inc, which is undertaking an internal engineering study before deciding how to proceed with work on the property.

Drilling at NW-Expo confirmed porphyry style gold and molybdenum mineralization and identified significant rhenium values. Two holes drilled in the Hushamu deposit confirmed molybdenum (not included in the existing historical resource estimate) and identified significant rhenium values. Highlights of drilling at Hushamu included 179.3 m at 0.47 g/t Au, 0.42% Cu, 0.011% Mo and 0.44 g/t Re and 164m @ 0.51 g/t Au, 0.30% Cu, 0.007% Mo and 0.42 g/t Re.

Exploration at **Myra Falls** (Breakwater Resources Ltd) was successful close to existing mine infrastructure in a drill program based on existing platforms. Exploration drilling in the latter part of 2009 had three targets west of the Battle lens: the West Gap, West Gopher down drop and a new zone, the RE-108 lens, which remains open to the west. The latter is defined to an extent that it is being developed and brought into the mine plan. The South Flank drill program continued in 2009, delineating Main and East lenses. The South Flank entered production in 2009.

At the **Raven** coal project, operated by the Comox Joint Venture, the objective of a large drill program in 2009 was largely to upgrade the 59 Mt inferred resource to measured and indicated categories. This would allow the current feasibility study to be based on a larger resource than the 39 Mt (measured and indicated) estimated in 2007. Drill intersections released to date encountered coal in all but one hole with the large majority of Seam 1 intersections exceeding 1.5 m thickness. Two of five known seams in the Tsable River area have been identified as of economic importance: Seam 1 (the lowermost) and Seam 3.

Mining and processing of a bulk sample and a drill program proceeded on the **Mineral Creek** property near Port Alberni in 2009. Bitterroot Resources Ltd and Mineral Creek Ventures Inc share the costs and proceeds of the bulk sample. Bitterroot has now increased its ownership in the overall project to 100%. Drilling at Mineral Creek in 2009 concentrated on close-spaced definition drilling of the Ember vein, a 2008 discovery now defined over a 150 m strike length and elevation range of 90 m. In the course of this work, another vein was discovered, the HW-1, the sixth gold-bearing vein known on the property. A goal of the current program is to facilitate a preliminary resource estimate. Both the Ember and the HW-1 remain open along strike and down dip.

New work at the **Catface** project north of Tofino in 2009 consisted of access road construction for a planned



Photo 37. The ball mill and gravity table used to process a bulk sample at the Mineral Creek project.

2010 drill program. Selkirk Metals Corp published a new resource estimate in 2009 for the Cliff zone that included 56.9 Mt indicated resources at 0.4% Cu and 262 Mt of 0.38% Cu in the inferred category. In addition, Selkirk shareholders approved a proposed merger with Imperial Metals Corporation in 2009.

Logan Resources Ltd also released an updated resource estimate for its **Brynnor** iron project in 2009. There is a measured plus indicated resource of 12.07 Mt at 37.6% Fe and an inferred resource of 12.68 Mt at 39.5% Fe.

Pacific Iron Ore Corporation continued its exploration program at the **Pearson** project near Port Renfrew in 2009. Prior to the field program, they published an inferred resource of 7.8 Mt grading 63% magnetite at a cutoff of 20% magnetite. Part of the 2009 program was designed to expand this resource. Another skarn zone was also tested. In addition there are maficultramafic rocks found within the West Coast Crystalline Complex, some of which yielded anomalous nickel, copper and platinum group element values in float and soil samples. There are also extensive deposits of glacial clay on the property.

On the central coast, Solomon Resources Limited explored the **Bonanza-Sitka** gold property, re-opening trenches and seeking an extension of the known vein system.

Wallbridge Mining Limited continued exploration on its **Rogers Creek** property north of Harrison Lake in 2009 with a large IP survey, mapping, prospecting and rock sampling. Results of an initial 3-hole drill program were consistent with porphyry style copper-gold-silvermolybdenum mineralization. Wallbridge discovered an



Photo 38. Pilings at the former Brynnor Mine's outloading facility in Toquart Inlet. Magnetite iron ore was shipped to Japanese steel mills from this site in the 1960s.

additional copper-molybdenum showing on the southwestern part of its extensive property, in the Fire Mountain area approximately 18 km from the focus of current drilling.

Near Yale, Lehigh Hanson Materials Ltd drilled the **Hillsbar** aggregate deposit. Results were not released at the time of writing. This recent project is unrelated to the Hills Bar project, which entered the Environmental pre-application process in 2003.

Module Resources Incorporated began its exploration program on the **Ladner Gold** property near Hope. Work included improvement of access and rehabilitation of underground workings at the former Carolin Mine, the objective of which is an underground mapping and drilling project. They have also begun testing of the mine tailings in cooperation with DryVac Services Canada Ltd for possible gold recovery. Exploration drilling began on surface at the McMaster zone with a five-hole, 800 m program. That zone is being investigated as a potential open pit resource.

BRITISH COLUMBIA EXPLORATION AND MINING INITIATIVES

During 2009, the government of British Columbia continued a number of measures to assist mineral exploration, mining and mineral resource planning, including a program of enhancing the provincial geoscience information available to attract investment to sustain the mining sector and continuing the **Minister's Council for Mineral Exploration and Mining**. This council, which was established in 2008, works to identify the conditions necessary for the long-term success of mineral exploration and mining in an evolving environment. Members of the council have been chosen to represent the different facets of the mining and minerals sector. They are from the Aggregate Producers



Photo 39. The portal at the former Carolin Mine was re-timbered as part of the underground rehabilitation at the Ladner project. Photo courtesy Module Resources Incorporated.

Association of British Columbia, Association for Mineral Exploration British Columbia, Coal Association of Canada, First Nations Leadership Council, Mining Association of British Columbia and the mineral industry. In January 2009, the **Mining Economic Task Force**, announced by Premier Gordon Campbell, delivered on its mandate with the submission of the Mining Economic Task Force Report to the Minister's Council for Mineral Exploration and Mining that included a number of recommendations for the mineral sector. Key recommendations include:

- An investment of \$2 million to the Reclamation and Prospecting (RAP) program to support the development of leadership and employment skills in First Nations communities in northern British Columbia.
- As announced on April 7, 2009, resource revenue sharing with First Nations will now apply to expansions of existing mines.
- An investment of \$37.5 million in provincial capital funding for the new \$75-million state-of-the-art Earth Systems Science Building at the University of British Columbia due to open in early 2012 helping to address future human resource needs of the mining industry.
- A commitment to the development of a provincial position to inform the federal review on port pricing and service practices as it relates to the mining industry, in collaboration with the Ministry of Transportation and Infrastructure.
- A commitment to lead a ministerial and staff delegation with industry leaders to Ottawa to address recommendations on the environmental

assessment process, taxation policy, rail and port pricing, and infrastructure initiatives.

• Government has received a commitment from the Minister of Natural Resources Canada to explore federal expansion and an amendment to the flow-through eligibility and status.

Key initiatives undertaken by the provincial government include:

- Since 2005, the Province has supported Geoscience BC with \$36.5 million to complete geoscience surveys to attract mineral and oil and gas exploration work. The launch of the QUEST-South program, announced August 7, 2009, will build on Geoscience BC's successful OUEST OUEST-West and exploration geoscience projects, which combined regional geochemical surveys with regional airborne geophysics techniques to stimulate more exploration industry interest in central British Columbia.
- The federal government announced on Sept. 16, 2009 that \$130 million in funding would be made available under the federal Green Infrastructure Fund towards construction of the Northern Power Line Northwest Transmission Line (NTL) along Highway 37 and the Province announced the development of the NTL would proceed under a partnership with the Government of Canada to electrify the North. The new 287-kilovolt line would extend 335 km from Terrace to Meziadin Junction north to Bob Quinn Lake. This project has the potential to significantly reduce anticipated operating costs at a number of potential mine developments near the route and could spur significant new capital investment in the region.
- The authorization has been given for provincial negotiators to include **revenue sharing with First Nations** on new mining projects and expansions of existing projects. The process for revenue sharing will be decided on a project-by-project basis. The revenue-sharing approach will be used where there is a proposed project that will result in a new stream of direct resource revenue to the Province. This process will ensure that First Nations receive revenue throughout the life of those mining projects.
- The province extended the Mining Flow-Through Share Tax Credit to the end of 2010. The Mining Flow-Through Share Tax Credit was introduced in BC in 2001, paralleling a federal program. The 20 per cent BC Mining Flow-Through Share Tax Credit is available only to individuals. The combined effect of the flowthrough share deduction, the federal credit and the provincial credit for an individual investor is

to reduce the cost of a \$1,000 investment related to mineral exploration to about \$383.

- The province extended both the Mining Exploration Tax Credit and the New Mine Allowance through 2016. Companies can access a refundable mineral exploration tax credit of an additional 10% in prescribed Mountain Pine Beetle affected areas.
- The province has very competitive **corporate tax rates** at 11%, no corporation capital tax, and no sales tax on machinery and equipment. The corporate tax rate will be further reduced to 10.5% in 2010.
- The province supports the "**one project**, **one review**" approach on environmental assessments and is working with the Federal Government to reduce the regulatory burden.
- The province restarted the Mine Development Review Committees in each region to facilitate cooperation amongst all government agencies.
- The province released *A Practical Guide for Aggregate Operators* to enhance the health and safety of workers at British Columbia's aggregate mining operations.
- The province has contributed over **\$4.8 million** in funding for mining education and skills training for communities and First Nations, since April 2005.

THE BRITISH COLUMBIA GEOLOGICAL SURVEY

The British Columbia Geological Survey is committed to supporting a thriving, safe and responsible mining industry for the benefit of all British Columbians. We accomplish this by providing expert advice to government on mineral resources, globally competitive geoscience expertise, data to attract mineral industry investment, and geoscience information to the public. The Survey has been provincial geoscience data custodian for more than 100 years; this includes data collected by Geoscience BC. The Survey operates field-based, applied geoscience programs to fulfill its core responsibility of bedrock and surficial geological surveying and improving the mineral resource inventory of the province.



Photo 40. Andrew Legun, Coal Geologist with the Geological Survey of BC, leading an industry field trip in Northeastern BC.

2009 PROGRAM

The British Columbia Geological Survey had an active year with 5 field projects, ongoing progress in delivering geoscience data to industry, government and other clients; leading industry field trips and participating in conferences and workshops; and, significant collaboration and interaction with other agencies.

Ongoing field mapping programs were carried out near Princeton and for industrial minerals in southern British Columbia (see Figure 8). New projects initiated in 2009 were surficial mapping and till sampling in the area southwest of Houston, mapping and mineral deposit studies on the north coast and near the Iskut River. Office based projects included completion of geology maps for North Vancouver Island, continued expansion of Property File information on line, compilation of Quesnel Terrane geology from Clearwater to 100 Mile House and Williams Lake to Mackenzie, regional geochemistry catchment basins and sample locations snapped to 1:20,000-scale rivers, Spences Bridge epithermal deposits and host geology, and a number of mineral potential assessments for government. The results of these program activities are available on-line and many are described in the Survey's annual Geological Fieldwork 2009 publication: www.empr.gov.bc.ca/Mining/Geoscience/PublicationsCat alogue.

The Princeton mapping and mineral deposits project, led by Nick Massey, entered its final year. Shelley Oliver, a graduate student at the University of British Columbia, is studying the volcanic rocks in the area. This program is increasing the understanding of the regional geology that hosts copper and gold deposits in the area.

The Survey's industrial minerals specialist, George Simandl, completed field work on the Blue River carbonatite complex and visited a number of other sites, including a high alumina shale quarry, specialty clays, magnetite occurrences and processing plants. He also contributed to our knowledge of non-sulphide lead-zinc deposits in the province.

The North Coast mapping and mineral deposits project completed its first year of three. JoAnne Nelson is leading this project and partnering with the Geological Survey of Canada GEM Edges Project. The crew completed geological mapping of a 30 by 50 km area covering Porcher Island and along the Grenville Channel, which identified rocks prospective for massive sulphide deposits.

The Iskut River partnership project, a partnership with Edges, industry and the University of Victoria, began in the fall of 2009 led by Mitch Mihalynuk. The Survey worked with the University of Victoria and Pacific Northwest Capital Corp to determine the 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.

The Tahtsa Lake geochemistry and surficial geology project is being completed in partnership with Geoscience BC, Northwest Community College and Smithers Exploration Group. Travis Ferbey completed the first season of mapping and till sampling southwest of Houston. Geochemical results from this project will help guide mineral exploration in the area.

In addition to producing new geoscience through field programs, the Survey is the key custodian and source of public minerals geoscience information for BC. The MapPlace is a important exploration tool to access many databases, including MINFILE, Property File, the provincial geology map, assessment reports and regional geochemical data.

While geological mapping by the Survey does not specifically focus on the search for new mineral occurrences, significant mineralization is discovered almost every year during the course of fieldwork. For



Photo 41. Mitch Mihalynuk and Toby Stier prepare for a traverse near the Rock and Roll Property in northwest BC. Photo provided courtesy of Murray Jones.

example, during the summer of 2007 and 2008 mapping crews in the Chezacut area in the Mountain Pine Beetle impacted area discovered 11 mineralized zones in an area where only one mineral occurrence was known previously. During 2009 field work in the Blue River area, George Simandl located a new vermiculite occurrence of potential economic significance that was not recorded in government's database, MINFILE or known by the company that drilled a nearby rare earth zone in 2008.

PARTNERSHIPS

Many of British Columbia Geological Survey programs involve cooperative partnerships with other agencies, universities, First Nations, local communities, and industry. Geoscience BC, a key partner of the Survey, is contributing new geophysical, geochemical and other geoscience data to attract mineral exploration to the province. Specific joint projects involving Geoscience BC in 2009 were till sample analysis from south of Houston, MINFILE and Property File updates for the parts of the QUEST area (Quesnel Trough), a workshop and followup project to revise the bedrock geology for the QUEST area using input from geophysics, and uploading all Geoscience BC data on MapPlace. The survey continued its long collaboration with the Geological Survey of Canada on a number of field programs with the commencement of the Edges project. The Survey also was an active member of the National Geological Surveys Committee and the Committee of Provincial Geologists.

GEOSCIENCE BC

Geoscience BC works in partnership with industry, academia, government, First Nations, and communities to develop and fund applied geoscience projects with the objective to attract mineral and oil and gas exploration to British Columbia. Many of their projects are identified through an annual process of requests for proposals for innovative geoscience projects. In addition, Geoscience BC develops major projects to generate new geoscience data for priority areas in British Columbia. In all cases, Geoscience BC seeks collaborative and partnership projects that come with supportive funding. Geoscience BC's work complements the work of the BC Geological Survey.

In 2009, Geoscience BC continued to sponsor geoscience projects throughout the province, all designed to attract mineral and oil and gas investment to British Columbia.

- Geoscience BC released the results of the QUEST-West Project airborne electromagnetic survey and regional geochemical programs in early 2009. This project was conducted in partnership with the Northern Development Initiative Trust, and the Regional Districts of Bulkley-Nechako and Kitimat-Stikine.
- Geoscience BC started the QUEST-South project in 2009, which included an airborne gravity survey focused on the Quesnel Terrane from Williams Lake south to the U.S.A border, and two regional geochemical programs. The new geochemical sampling program (stream and soil) focused on NTS sheet 92I (Ashcroft), and the geochemical reanalysis program focused on eight 1:250 000 NTS sheets, stretching from Revelstoke west to Pemberton and from Williams Lake south to the USA border. Results from these surveys will be released in early 2010.
- Including the QUEST-West Project data releases, Geoscience BC produced nineteen reports and/or datasets in 2009. Highlights included geophysical inversions of the QUEST Project geophysical data and two value-added



Photo 42. Collecting a sample for geochemical analysis. Photo provided courtesy of Geoscience BC.

interpretations of the QUEST Project geochemical data.

- Geoscience BC committed funding to 12 new minerals geoscience projects through their request for proposals process in 2009.
- In September, Geoscience BC hosted a half-day open house, with project proponents presenting ongoing and completed project results to industry and other interested parties.
- Geoscience BC partnered with the Terrace Economic Development Association and the Regional District of Bulkley-Nechako to hold regional geoscience workshops in Terrace and Burns Lake in February and October respectively. Geoscience BC also sponsored a geophysical workshop at the 2009 Minerals South conference in Cranbrook.

Geoscience BC's annual Summary of Activities volume, containing twenty-five technical reports on Geoscience BC's ongoing and recently completed projects will be released in early 2010 in time for the annual Mineral Exploration Roundup. More details on all of Geoscience BC's projects and reports are available from their website at <u>www.geosciencebc.com</u>.

ASIA PACIFIC INVESTMENT MISSION AND RELATED INITIATIVES

Throughout the year Ministry of Energy, Mines and Petroleum Resources staff work with companies, industry associations and other government agencies to attract Asian companies seeking investment and partnership opportunities to British Columbia and to coordinate matchmaking with foreign delegations. For example, the Ministry helps the mineral industry from the province by distributing standardized company profiles and assists incoming delegations by meeting with them and publishing various brochures and documents in Asian languages. Both the profiles and brochures are available the Ministry's website on (http://www.empr.gov.bc.ca/MACR/investors/Pages).

As well, for the last four years the Ministry has sponsored Asia Investment Missions (AIM) to coincide with the China Mining Congress, a conference held in Tianjin in mid-October, 2009. This delegation was led by ministry staff from the BC Mineral Development Office in Vancouver and the Marketing and Investor Relations Branch in Victoria. Exploration, mining and mining service companies and industry associations played key roles associated with AIM and the companies were given opportunities to showcase their projects and to meet interested Asian companies. The mission in 2009 followed the format of the missions in 2007 and 2008 and also included visits to companies and government agencies in Tokyo and Seoul as part of AIM.



Photo 43. As part of the Asia Investment Mission, Canadian jurisdictions cooperated to organize project presentations by participating companies to members of the Chinese government, large resource companies and investors in Beijing.



Photo 44. Business to business meetings between Canadian and Chinese companies in Beijing, part of the 2009 Asia Investment Mission.

Current plans are to organize a fifth Asia-Pacific Investment Mission for the fall of 2010. Similar to the previous missions, the Ministry of Energy, Mines and Petroleum Resources will work with interested companies from the mineral industry, the Association for Mineral Exploration British Columbia, Geoscience BC, the Mining Association of British Columbia and governmental agencies to participate in AIM. If your company is interested in profiling your projects or investment opportunities over the next months or participating in the fall investment mission, you can contact the BC Mineral Development Office in Vancouver or the Marketing Branch in Victoria at the addresses below.

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For more marketing-related information, visit the following website:

http://www.empr.gov.bc.ca/MACR/EnergyAndMinin gOpportunities/Pages

2010 MINERAL INDUSTRY OUTLOOK

The wild roller coaster ride that overtook the financial markets in 2008 continued through the start of 2009 as significant changes to many major institutions in the U.S.A. revealed the full extent of the global financial crisis. In a speech to AMEBC members, Don Lindsay, President and CEO of Teck, compared the financial fallout that occurred over a six-month period to the three years of the Great Depression. It was extremely difficult for mineral exploration companies to raise funds on the markets, and even high quality projects were unlikely to attract investors, despite metal and coal prices that had started to rebound.

Fortunately, coal contracts signed in the spring reflected a positive global demand, particularly for metallurgical coal at more than a \$100 per tonne, led to a recovery during the summer for coal exploration and development projects. During the fourth quarter of 2009, there was a revival of exploration activity in the province driven by high prices for gold (in excess of US\$1,000 per ounce) and copper (in excess of US\$3.00 per pound). Mining and mineral exploration companies began to resume expansion and drilling programs that were rapidly halted when the financial crisis first hit.

As is typical in the mineral industry economic cycle, the recovery is being led by commodity price increases in metals and coal. This cycle was being driven by increasing demand in emerging markets, such as China and India.

Certainly, the major infrastructure program of the People's Republic of China had a significant impact on demand for mineral commodities in 2009, during the period of weak demand from U.S. markets. Market fundamentals support continuing strong prices for coal and copper over the next few years and the potential for rebounds in several other mineral commodities.

As noted in the 2008 Overview, the financial climate left a number of exploration and mining companies vulnerable to acquisition and merger activities. Astute investors, largely from Asia, recognized the good buying opportunity and used this period to secure mineral resources for their growing economies. Some of the announced deals in 2009 included China Investment Corporation acquiring a 17% interest in Teck's coal operations, Mitsubishi Materials Corp. (Japan) acquiring a 25% interest in Copper Mountain Mining Corporation, LG International (Korea) and Itochu Corp (Japan) entering a joint venture with Compliance Energy Corporation on the Raven Project and Taseko Mines Ltd announcing a tentative deal with Sojitz (Japan) on the Gibraltar Mine.

The downturn that continued through most of 2009 also saw mineral tenure acquisition dropping from 2008 levels, with new tenures falling to approximately 3.2 million ha from 5.2 million ha in 2008.

Over the next number of years it is anticipated that British Columbia's mineral industry will continue to build a stronger connection to Asian markets and companies. This will involve building on existing relationships with Japan and Korea and developing new business connections with China. Key Chinese government agencies are encouraging investment outside of China in early stage exploration projects, in addition to their more traditional approach of seeking projects closer to the development stage and easing restrictions on foreign investments by Chinese private sector companies. Chinese government agencies view British Columbia and Canada as a very attractive destination for foreign investment on the part of Chinese companies, pointing to government stability, the availability of high quality geoscience information and transparency in processes as key factors. These Asian relationships can involve investments in mine developments and expansions, support for mineral exploration projects, purchasing coal and minerals and signing memorandums of understanding. British Columbia is Canada's Pacific Gateway and a natural business partner for Asian companies.

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