

Exploration and mining in the South Central Region, British Columbia



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Recommended citation: Northcote, B., 2022. Exploration and mining in the South Central Region, British Columbia. In: Provincial Overview of Exploration and Mining in British Columbia, 2021. British Columbia Ministry of Energy, Mines and Low Carbon Innovation, British Columbia Geological Survey, Information Circular 2022-01, pp. 85-104.

1. Introduction

With four major mines in operation, the South Central Region is currently the most productive copper mining district in Canada. The region's varied geology, well-established infrastructure, and access to markets also make it an important industrial minerals centre. The Cariboo area is the province's largest placer gold camp, with active permits numbering in the hundreds. Thermal coal resources in Cenozoic basins were last mined in 2013.

The region has four major proposed metal mines and a proposed small gold mine re-start. About 100 exploration projects were tracked in 2021, although this represents a minimum because not all exploration work is recorded.

Estimates for exploration expenditures, drilling programs, and other metrics were captured in the British Columbia Mineral and Coal Exploration Survey, a joint initiative of the Province of British Columbia Ministry of Energy, Mines and Low Carbon Innovation, the Association for Mineral Exploration in British Columbia, and EY LLP. For the South Central Region, exploration expenditures were estimated at \$147.6 million and exploration drilling 462,500 m (Clarke et al., 2022; EY LLP, 2022). These are significant increases from 2020, which saw \$69.3 million in expenditures and 212,000 m of drilling (Clarke et al., 2022; EY LLP, 2022).

The largest exploration programs focussed on orogenic and epithermal gold veins, but porphyry copper-gold exploration near mine sites and at some advanced exploration projects were also significant contributors to the totals.

2. Geological overview

The tectonic and metallogenic evolution of the Canadian Cordillera are intimately linked (Fig. 1, e.g., Nelson et al., 2013). The South Central Region straddles three of British Columbia's five morphogeological belts (from west to east: Coast; Intermontane; Omineca). The mid-Mesozoic and older geological framework is represented by cratonic and pericratonic rocks in the east, and a series of Late Paleozoic through mid-Mesozoic arc and oceanic terranes to the west (Fig. 1). Younger rocks include Jura-Cretaceous siliciclastic and local volcanic rocks, Eocene volcanic rocks, Neogene

and Quaternary basalt, and Middle Jurassic to Eocene granitic intrusions.

The oldest rocks in the region are Paleoproterozoic basement gneiss complexes at the eastern boundary, such as in the Monashee complex. These are interpreted as parts of the North American craton (Armstrong et al., 1991), overlain by Neoproterozoic to Paleozoic cover deposited following rifting that formed the western margin of Ancestral North America (McDonough and Parrish, 1991; Murphy et al., 1991). To the northwest, the Cassiar terrane consists of Neoproterozoic to mid-Paleozoic siliciclastic and carbonate rocks interpreted as distal facies of the North American platform (Struik, 1988a). Also affiliated with Ancestral North America, the Kootenay terrane (deep-water basin strata on Figure 1) include Neoproterozoic to mid-Paleozoic deep-water facies equivalents deposited west of the North American platform. Lower Cambrian and older rocks are similar to North American strata to the east, but the overlying lower Paleozoic succession is characterized by units of coarse siliciclastic and mafic volcanic rocks that may reflect intermittent crustal extension (Colpron and Price, 1995). This belt also includes Devonian-Mississippian calc-alkaline to alkalic volcanic rocks and associated granitoid intrusions, found mainly in the Eagle Bay assemblage (Schiarrizza and Preto, 1987), which reflect the initiation of east-dipping subduction beneath the North American plate margin. These rocks host polymetallic volcanogenic massive sulphide (VMS) occurrences, and the **Yellowhead** bulk tonnage copper deposit. Slide Mountain terrane is the easternmost tract of oceanic rocks in the Canadian Cordillera. These rocks may be the remnant of a Late Paleozoic marginal basin that formed behind a westward-retreating volcanic arc in Quesnel terrane. The Fennell Formation hosts copper-zinc-silver massive sulphide mineralization at the **Chu Chua** occurrence.

Quesnel terrane is a Late Triassic to Early Jurassic island arc complex (e.g., Mortimer, 1987; Struik, 1988a, b; Unterschutz et al., 2002). It also includes a Late Paleozoic arc sequence, represented by the Harper Ranch Group (Beatty et al., 2006) and, in the south, assemblages of oceanic rocks (Tempelman-Kluit, 1989). The Mesozoic rocks are represented mainly by Middle to Upper Triassic volcanic and sedimentary rocks of the

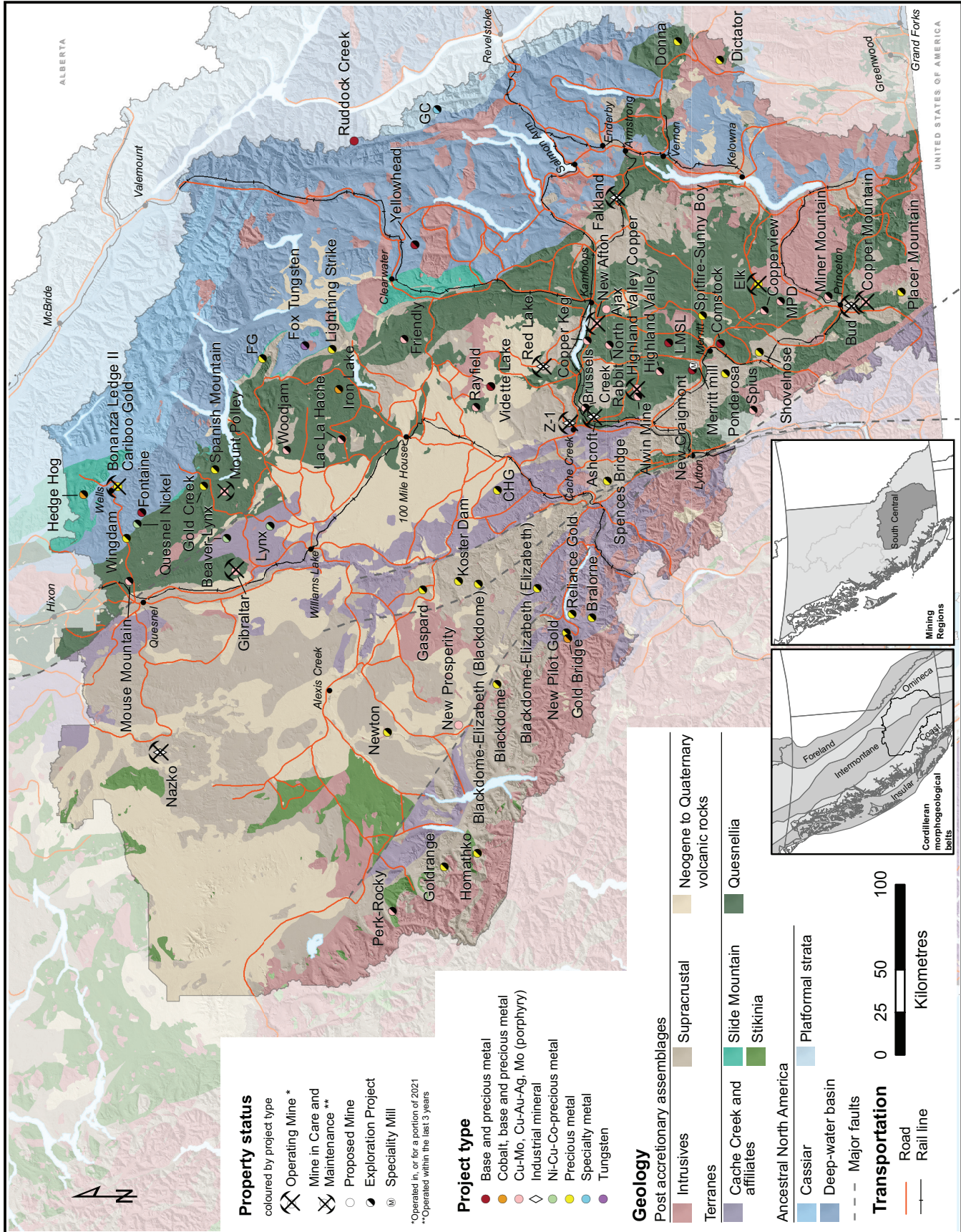


Fig. 1. Mines, proposed mines, and selected exploration projects, South Central Region, 2021. Terranes from Nelson et al. (2013).

Nicola Group, together with abundant Upper Triassic to Lower Jurassic calc-alkaline to alkaline intrusions (Preto, 1977, 1979; Mortimer, 1987; Panteleyev et al., 1996; Schiarizza et al., 2013). The Nicola Group consists mainly of volcanic and volcanic-derived sedimentary rocks, but also includes siltstone and slate intercalated with quartzite and limestone (Bloodgood, 1990; Schiarizza et al., 2013; Mihalynuk et al., 2015; Schiarizza, 2019; Mihalynuk and Diakow, 2020). The volcanic rocks are mainly augite-phyric shoshonitic basalts, but the western part of the group locally includes a belt of calc-alkaline volcanic rocks with substantial amounts of rhyolite and dacite (Preto, 1977, 1979; Mortimer, 1987). A younger stratigraphic component of Quesnel terrane consists of Lower to Middle Jurassic sedimentary rocks that unconformably overlie the western parts of the Nicola Group (Travers, 1978; Logan and Moynihan, 2009; Schiarizza et al., 2013).

Quesnel terrane is important for its porphyry copper deposits (e.g., Logan, 2013; Logan and Mihalynuk, 2014). The plutons that host these deposits conform, in part, to a pattern defined by parallel belts of calc-alkaline and alkalic plutons that become progressively younger from west to east (Schiarizza, 2014). The western (Late Triassic) calc-alkaline belt includes the Guichon Creek batholith, host to the **Highland Valley Copper** copper-molybdenum mines, and the Granite Mountain batholith, host to the **Gibraltar** copper-molybdenum mine. A well-defined belt farther east comprises younger, latest Triassic alkalic plutons, which host alkalic porphyry copper-gold deposits, including producing mines at **Copper Mountain** and **New Afton** and the **Mount Polley** mine, which is currently on care and maintenance. A third belt, younger and farther to the east, is defined by several large, Lower Jurassic calc-alkaline plutons.

Cache Creek terrane, consisting of Carboniferous to Early Jurassic chert, argillite, basalt, limestone, sandstone, gabbro, and serpentinized ultramafic rocks of the Cache Creek complex, forms a belt to the west of Quesnel terrane in the central and northern parts of the region. It is interpreted, at least in part, as a subduction complex responsible for generating the Quesnel magmatic arc (Travers, 1978; Struik et al., 2001).

Cadwallader terrane, as interpreted by Schiarizza (2013), underlies parts of the Intermontane and eastern Coast belts, west of Cache Creek and Quesnel terranes. It includes a Late Permian-Early Triassic primitive oceanic arc complex, and an overlying Late Triassic-Middle Jurassic arc complex and associated siliciclastic apron.

Bridge River terrane is in the eastern Coast belt, west of Lytton and Lillooet, where it is partially enveloped by Cadwallader terrane. It is represented mainly by the Bridge River complex, comprising structurally interleaved slivers of chert, argillite, basalt, blueschist, gabbro, serpentinite, limestone, and sandstone (Schiarizza et al., 1997). Both Cadwallader and Bridge River terranes are shown as ‘Cache Creek and affiliates’ on Figure 1.

Stikine terrane is a mid-Paleozoic to Middle Jurassic arc terrane that is markedly similar to Quesnel terrane, and forms a predominant component of the Cordillera in central and

northern British Columbia. It is represented in the northwestern part of the South Central Region by a few scattered exposures of volcanic and sedimentary rocks correlated with the Hazelton Group (Upper Triassic to Middle Jurassic; Tipper, 1959, 1969). Younger stratigraphic units overlap older terranes and cover large parts of the region. These units include: Upper Jurassic to Upper Cretaceous siliciclastic rocks of the Tyaughton-Methow basin, which overlap Cadwallader and Bridge River terranes in the eastern Coast belt (Schiarizza et al., 1997); and mid-Cretaceous arc volcanic rocks of the Spences Bridge Group, which form a northwest-trending belt that overlaps Quesnel and Cache Creek terranes in the Merritt-Lillooet area (Monger and McMillan, 1989), and continues westward across the Fraser River where it overlaps Cadwallader and possibly Stikine terranes (Mahoney et al., 2013). Eocene volcanic and subordinate sedimentary rocks (e.g., Kamloops Group, Penticton Group, Princeton Group) are prominent in some locations. Neogene basalt of the Chilcotin Group overlaps Quesnel, Cache Creek, Cadwallader, and Stikine terranes throughout much of the central part of the region (Dohaney et al., 2010). Granitic plutons, ranging from late Middle Jurassic to Eocene, occur throughout the region and, in some cases, are responsible for significant mineralization (e.g., **IKE**, **New Prosperity**).

3. Mines and quarries

The region produces copper, molybdenum, gold, and silver from four large mines, and a variety of industrial minerals (bentonite, zeolite, diatomaceous earth, gypsum, pumice, opal, and dimension stone) from about ten quarries. Almost 1000 placer mines and gravel pits have active permits, but not all produce in any given year.

3.1. Metal mines

The South Central Region hosts six of the province’s metal mines (Fig. 1; Table 1). These include the province’s two largest copper-molybdenum producers (**Gibraltar** and **Highland Valley Copper**) and two major copper-gold mines (**New Afton** and **Copper Mountain**). A third copper-gold producer, **Mount Polley**, has been on care and maintenance since 2019, awaiting a sustained improvement in copper prices. The region hosts two precious metal mines, **Bonanza Ledge II**, which resumed mining mid-2021 and **Elk**, which began mining ore in November.

3.1.1. Bonanza Ledge II (Osisko Development Corp.)

Barkerville Gold Mines Ltd. (now under Osisko Development Corp.) restarted the **Bonanza Ledge** mine (Fig. 1; Table 1) in 2017 as an underground long-hole and cemented fill operation below the existing pit. Osisko Development Corp. began a second phase of underground mining at Bonanza Ledge in 2021. Phase II will exploit the BC vein at a targeted rate of 650 tpd. Bonanza Ledge is part of the larger Cariboo Gold project, a proposal for a larger 15-year mining operation to the north. A permit amendment allows for production of up to

Table 1. Metal mines, South Central Region.

Mine	Operator (partner)	Commodity; deposit type; MINFILE	Forecast 2021 Production (based on Q1-Q3)	Reserves	Resources	Comments
Bonanza Ledge II	Osisko Development Corp.	Au; Au-quartz veins; 093H 140	na	na	Bonanza Ledge II M: 240,000 t 5.1 g/t Au I: 1,671,000 t 4.3 g/t Au Inf: 2,398,000 t 3.1 g/t Au	Production at Bonanza Ledge resumed in March 2021. Target rate of 650 tpd.
Copper Mountain	Copper Mountain Mining Corporation 75%, Mitsubishi Materials Corporation 25%	Cu, Au, Ag; Porphyry Cu-Au, Alkalic; 092HSE001	90-100 Mlb Cu+Au, Ag (management's guidance)	P+Pr: 403.433 Mt 0.24% Cu, 0.11 g/t Au, 0.76 g/t Ag	M+I: 597,124 Mt 0.23% Cu, 0.10 g/t Au, 0.70 g/t Ag Inf: 311.010 Mt 0.20% Cu, 0.10 g/t Au, 0.50 g/t Ag	Third ball mill commissioned for 45 ktpd throughput. Exploration drilling ongoing. Resources inclusive of reserves.
Elk	Gold Mountain Mining Corp.	Au, Ag; Au quartz veins; 092HNE009, 295, 41, 261	na	na	Combined Elk property M+I: 4.359 Mt 5.6 g/t Au, 11.0 g/t Ag Inf: 1.497 Mt 5.3 g/t Au, 14.4 g/t Ag	Began mining ore in November. Ore is to be trucked to New Afton. Exploration drilling and updated resource estimates.
Gibraltar	Taseko Mines Limited 75%, Cariboo Copper Corp. 25%	Cu, Mo; Porphyry Cu±Mo±Au; 093B 012	120 Mlb Cu+Mo (management's guidance)	P+Pr: 538 M short tons 0.25% Cu, 0.008% Mo	M+I: 1048 M short tons 0.25% Cu, 0.007% Mo	Resources inclusive of reserves.
Highland Valley	Teck Resources Limited	Cu, Mo; Porphyry Cu±Mo±Au; 092ISW012, 45	128,000-133,000 t Cu and 1.2-1.8 Mlbs Mo (management's guidance)	P+Pr: 401.6 Mt 0.30% Cu, 0.007% Mo	M: 724.1 Mt 0.28% Cu, 0.008% Mo I: 999.7 Mt 0.24% Cu, 0.009% Mo Inf: 406 Mt 0.23% Cu, 0.007% Mo	2040 extension plan under consideration which would yield 4.3 Blbs Cu and extend mine life.
Mount Polley	Imperial Metals Corporation	Cu, Au, Ag; Porphyry Cu-Au, Alkalic; 093A 008	nil	P+Pr: 53.772 Mt 0.34% Cu, 0.90 g/t Ag	Open pit M+I: 186.9 Mt 0.27% Cu, 0.28 g/t Au, 0.49 g/t Ag Inf: 4.6 Mt 0.18% Cu, 0.21 g/t Au, 0.39 g/t Ag Underground M+I: 7.42 Mt 0.94% Cu, 0.35 g/t Au, 6.57 g/t Ag Inf: 1.019 Mt 1.25% Cu, 0.58 g/t Au, 10.29 g/t Ag	Estimates were effective 2016. On care and maintenance since May 2019. Restart under consideration. Current reserves would support about 6 years operation.
New Afton	New Gold Inc.	Au, Ag, Cu; Porphyry Cu-Au, Alkalic; 092INE023	165-195 AuEq oz or approx. 57,000 oz Au, 28 kt Cu, 260,000 oz Ag (management's guidance)	P+Pr: 46.624 Mt 0.64 g/t Au, 1.8 g/t Ag, 0.74% Cu	M+I: 66.498 Mt 0.55 g/t Au, 2.0 g/t Ag, 0.68% Cu Inf: 18.313 Mt 0.36 g/t Au, 1.1 g/t Ag, 0.36% Cu	M+I resources are exclusive of reserves. Exploration is ongoing at Cherry Creek 3 km west of mine and regionally.

P = Proven; Pr = Probable; M = Measured; I = Indicated; Inf = Inferred

215,000 tpy of ore. The mine life of phase II is an anticipated 18 months. Ore is trucked to the Quesnel River Mill.

Two types of mineralization are of interest at Bonanza Ledge: pyrite replacement and vein, which consists of native gold in quartz veins cutting pyrite-bearing, carbonaceous and chloritic phyllite of the Snowshoe Group (Proterozoic-Paleozoic).

3.1.2. Copper Mountain (Copper Mountain Mining Corporation 75%; Mitsubishi Materials Corporation 25%)

The **Copper Mountain** copper-gold open-pit mine (Fig. 1; Table 1), has produced since August 2011 and mills at a rate of 40,000 tpd. Copper Mountain commissioned a third ball mill to increase milling capacity to 45,000 tpd. In the first nine months of 2021, the mine produced 73.4 Mlbs Cu, 23,263 oz Au and 443,444 oz Ag, more than the same period in 2020. Guidance for 2021 is 90-100 million pounds Cu. Mill expansion to 65,000 tpd is to be commissioned in 2024. In 2022, the mine will conduct trial use of electric trolley assist haul trucks to reduce diesel use.

Copper Mountain Mining Corporation reported exploration drilling at Copper Mountain. At the New Ingerbelle deposit, results extended mineralization below the current projected reserve pit shell to twice its previously known vertical extent. Drilling was also designed to expand resources and reserves at Copper Mountain North. Drilling continued into late 2021 at the Copper Mountain Main pit, North pit and New Ingerbelle deposit. Based on current reserves, the mine life is another 21 years; longer if resources are included.

The Copper Mountain ore bodies are Late Triassic alkalic porphyry Cu-Au deposits, mainly in Nicola Group rocks (Triassic) intruded by the high-level Copper Mountain intrusions (Upper Triassic). Holbek et al. (2015, 2020) described the deposit as an alkalic porphyry Cu-Au system with strong vertical continuity.

3.1.3. Elk (Gold Mountain Mining Corp.)

Gold Mountain Mining began mining operations at the **Elk** project in November. A 2021 updated Preliminary Economic Assessment considers a 70,000 tpy open pit-only operation expanding to 324,000 tpy open pit and underground after three years, which they anticipate would require an environmental assessment. The total mine life would be 11 years. The open pit schedule plans for 2.5 Mt ore at an approximate grade of 7 g/t Au and 11 g/t Ag. Ore is trucked to New Afton for processing under an agreement with New Gold Inc.

An 8700 m and subsequent 13,900 m drilling program included potential open pit and underground targets. Most of the second phase (10,500 m) targeted the Siwash North zone, the location of the largest current resource estimate. The remainder was on satellite targets. Highlights included 2.4 m of 20.20 g/t Au, 1.3 m of 10.59 g/t Au, and 1.1 m of 17.54 g/t Au at the Siwash North zone. Following drilling and as of December, the combined pit-constrained and underground resources were estimated at 4.359 Mt grading 5.6 g/t Au and 11.0 g/t Ag, Measured+Indicated and 1.497 Mt grading 5.3 g/t Au and

14.4 g/t Ag, Inferred (Table 1).

3.1.4. Gibraltar (Taseko Mines Limited 75%; Cariboo Copper Corp. 25%)

Taseko Mines Limited expects to produce approximately 120 million pounds of copper at **Gibraltar** in 2021, similar to 2020 (123 million pounds). As of December, transport infrastructure disruptions resulting from unusually intense rainstorms had affected shipments but not production. Current Proven and Probable reserves can support mining until 2038. The Polyanna pit provided the primary mill feed during 2021.

The calc-alkaline porphyry Cu-Mo deposit is in the Granite Mountain batholith (Upper Triassic; van Straaten et al., 2013; Schiarizza and Friedman, 2021) in a fault-bounded section of Nicola Group and Dragon Mountain succession volcanic and sedimentary rocks (Quesnel terrane; Schiarizza 2014, 2015, van Straaten et al., 2020) bounded by Cache Creek terrane rocks to the east and west.

3.1.5. Highland Valley Copper (Teck Resources Limited)

Management's guidance for the year is 128-133,000 t Cu and 1.2-1.8 million pounds Mo (Table 1). Copper production 2022-24 is projected at 135,000-165,000 tpy. Tonnes mined and milled in the first nine months of 2021 were lower than in 2020, but grades, recoveries, production, and sales were higher. Operations were suspended briefly due to a wildfire evacuation. Heavy November rains and resulting floods and landslides did not immediately affect production although Teck announced disruption of logistics between all its British Columbia operations and coastal terminals. Teck has scaled up electrification and automation of equipment since a pilot project started in 2018, increasing the number of autonomous haul trucks from six to an anticipated 35, close to 70% of their total fleet.

Teck is proposing an extension to the mine's projected life from about 2028 to at least 2040. The project is in the pre-application stage of environmental assessment. Teck submitted an update to the project description as engineering and design advanced. The submission includes plans for: extending the Highmont and Valley open pits; extending waste rock dumps; increasing tailings storage capacity; and upgrading pit infrastructure, processing facilities, and water and tailings infrastructure. In addition, the possibility of relocating part of Highway 97C and BC Hydro power lines is being examined. The company envisages increasing average mine production from 136,000 up to 178,000 tonnes tpd.

All mineralization at **Highland Valley Copper** is calc-alkaline Cu- Mo type in the Guichon Creek batholith (Upper Triassic), which has been divided into several pre-, syn- and post-mineral phases (see Byrne et al., 2013, 2020; Ryan et al., 2020).

3.1.6. Mount Polley (Imperial Metals Corporation)

Imperial suspended production at **Mount Polley** in 2019 in response to low copper prices. It is an open-pit operation with

an underground component. The mine has remained on care and maintenance, although management indicated an intention to restart mining and a plan was updated to account for current metal prices and late 2020 exploration results. The company is seeking financing to implement the restart. Remediation and monitoring are ongoing following the 2014 tailings dam breach.

The deposits at Mount Polley are alkalic porphyry Cu-Au in the syenitic to monzodioritic Polley stock (Upper Triassic-Lower Jurassic), which intrudes Nicola Group volcanic rocks. At least eight discrete mineralized zones have contributed to production or host resources (see Rees, 2013, Brown et al., 2016; Rees et al., 2020).

3.1.7. New Afton (New Gold Inc.)

The **New Afton** gold-copper mine (Fig. 1; Table 1) is a block cave operation that opened in mid-2012 (Hall and May, 2013). The New Afton deposits form a high-grade keel beneath the past-producing (1978-1997) Afton open-pit mine, an alkalic porphyry in the Iron Mask batholith (Upper Triassic). In the first 3 quarters of 2021 the mine produced 39,735 oz Au and 47.5 Mlb Cu or 134,898 AuEq oz. The mining rate was expected to increase and meet guidance for 2021 of 165-195 AuEq oz. Floods, landslides, and transport infrastructure collapse across British Columbia due to heavy rains in November did not immediately affect operations although disruptions to transportation routes may have a long-term impact.

The company reported both underground exploration drilling at the mine site and surface drilling within the mine footprint and on the Cherry Creek trend 3 km to the west. Work in the Cherry Creek trend area included drilling for deep porphyry style and shear-hosted gold mineralization. An early highlight of the surface drilling was 1 m of 21 g/t Au. The main targets are alkalic porphyry Cu-Au hosted by the Iron Mask batholith and volcanosedimentary rocks of the Nicola Group (Upper Triassic; Lipske et al., 2020).

3.1.8. Merritt Mill (Nicola Mining Inc.)

Nicola Mining's 200 tpd custom mill and tailings facility at the Craigmont mine site resumed operation in 2021, processing stockpiled ore from Blue Lagoon Resources Inc.'s Dome Mountain gold project in the Northwest Region. They expect to process more than 6000 t gold-mineralized quartz vein material (see Clarke, 2022).

3.2. Selected industrial mineral mines

More than a dozen industrial mineral quarries and processing plants are in the region (Fig. 1; Table 2). In addition, nearly 300 sand and gravel pits and 45 quarries have active Mines Act permits, although many are intermittently active. Industrial minerals producers and explorers compete in local markets and information is commonly not made public. Operations are listed here to highlight the local availability of selected products.

3.2.1. Ashcroft (IG Machine and Fibers Ltd.)

IG Machine and Fiber Ltd, a subsidiary of IKO Industries Ltd., operates the **Ashcroft** basalt quarry and roofing granule plant. They began production in 2001 and now typically produce 300,000 tpy of granules. The quarry is permitted to mine 500,000 tpy, 60% of which is processed into granule products. It has reserves of about 13 Mt or 30 years of production.

3.2.2. Falkland (Lafarge Canada Inc.)

Gypsum and anhydrite mined at the **Falkland** quarry, which no longer supplies Lafarge's cement plant in Kamloops, still supplies gypsum for other uses including agriculture. After operating intermittently for many years supplying cement to western Canada, the Kamloops cement plant and Harper Ranch limestone quarry of Lafarge Canada Inc. are now mainly on care and maintenance, although it produces some construction aggregate.

3.2.3. Kettle Valley quarries (Kelowna Sand and Gravel Ltd.)

Decorative rock and dimension stone are produced from small quarries throughout the region. Kelowna Sand and Gravel Ltd. mines gneiss, dacite tuff, and basalt at the Nipple Mountain, Kettle Valley, Canyon, and Gemini quarries and has been issued permits to explore other sites. Kettle Valley Stone Company of Kelowna produces flagstone, ashlar, facing stone, and landscape rock.

3.2.4. Nazko (Canlava Mining Corp.)

Canlava Mining produces red and black scoria from the **Nazko** quarry for geotechnical and other applications requiring lightweight fill. It is also sold for landscaping.

3.2.5. Red Lake and Bud (Absorbent Products Ltd.)

Absorbent Products Ltd. produces diatomaceous earth from the **Red Lake** quarry, and bentonite from the **Bud** quarry to manufacture cat litter, barn deodorizer, industrial absorbents, and carriers for agricultural products at their plant in Kamloops.

3.2.6. Bromley Creek (International Zeolite Corp.)

In 2014, Canadian Mining Company Inc. a subsidiary of International Zeolite, concluded its option agreement with Heemskirk Canada Ltd., and regained control of the **Bromley Creek** zeolite quarry. Absorbent Products Ltd. mines zeolite with agricultural and absorbent applications from the quarry.

3.2.7. Z-1 (Progressive Planet Solutions Inc.)

The **Z-1** mine is now owned by Progressive Planet Solutions, formerly Ashburton Ventures Inc. ZMM Canada Minerals Corp. is the operator. Their product is currently used as an agricultural feed additive, a growth medium, a filtration medium, a component of lightweight concrete, and for soil remediation.

Table 2. Selected industrial mineral mines and quarries, South Central Region.

Mine	Operator (partner)	Commodity; deposit type; MINFILE	Forecast 2021 Production (based on Q1-Q3)	Reserves	Resources	Comments
Ashcroft	IG Machine and Fibers Ltd. (IKO Industries Ltd.)	Basalt (roofing granules); 092INW104	300,000 t	na	Approx. 13.3 Mt in 2002	Typically mines 500,000 t with 60% processed into granule products.
Bromley Creek (Zeotech)	Absorbent Products Ltd. (owner International Zeolite Corp.)	Zeolite; Open system zeolites; 092HSE243	na	na	M+I (as of 2013-06-30): 550,000 t	
Bud	Absorbent Products Ltd.	Bentonite; 092HSE162	na	na	na	
Falkland	Lafarge Canada Inc.	Gypsum; 082LNNW001	na	na	Approx. 1.8 Mt	Found alternate uses since closure of Lafarge's Kamloops cement plant.
Kettle Valley Quarries	Kelowna Sand and Gravel Ltd./Kettle Valley Stone Company	Ashlar, flagstone, thin veneer; 082ENW109, 111, 112	na	na	na	
Klinker	Opal Resources Canada Inc.	Opal; 082LSW125	Intermittent operation	na	na	
Nazko	CanLava Mining Corporation	Lava rock; Cinder cone; 093B 060	na	na	Historical: 45 Mt	
Red Lake	Absorbent Products Ltd.	Diatomaceous earth; Lacustrine diatomite; 092INE081	na	na	na	
Z-1	Progressive Planet Solutions Inc.	Zeolite; Open system zeolites; 092INW095	na	na	Approx. 800,000 t	Historical resource.

P = Proven; Pr = Probable; M = Measured; I = Indicated; Inf = Inferred

4. Placer mines

The region has several hundred placer mines. Most of these operations are small, intermittent, or seasonal, and production data and details of exploration are generally unavailable.

4.1. Wingdam (Omineca Mining and Metals Inc.)

Preparations were underway for an underground bulk sample, including dewatering and rehabilitation of the decline to the mining face. Once active mining is underway, third parties may earn a 50% interest in the project. The project uses a freeze technology to gain access to a placer channel below Lightning Creek.

5. Mine development

Mine development projects are those that have a positive production decision and key government approvals, and on-site construction has begun. No major projects meet these criteria in the South Central Region.

6. Proposed mines

Proposed mines are defined as feasibility-stage projects for which the process of formal socioeconomic and environmental review has begun. For projects that exceed thresholds set by the British Columbia Environmental Assessment Act (or its federal equivalent), reviews are coordinated by the British Columbia

Environmental Assessment Office and Canadian Environmental Assessment Agency. Smaller projects are reviewed by an interagency Mine Development Review Committee (MDRC) chaired by the Ministry of Energy, Mines and Low Carbon Innovation. Four projects are in this category: **Ajax**, **Cariboo Gold**, **New Prosperity**, **Ruddock Creek** (Fig. 1; Table 3). Two projects, Taseko Mines Limited's **Yellowhead** and Spanish Mountain Gold Ltd.'s **Spanish Mountain** are active but have terminated or withdrawn environmental assessments. Ajax was rejected by both provincial and federal levels of government, and New Prosperity's provincial certification may expire in early 2022, having been extended 12 months. In none of these cases has the operator abandoned their project.

6.1. Proposed metal mines

6.1.1. Ajax (KGHM Ajax Mining Inc.)

The **Ajax** porphyry copper-gold project, owned by KGHM Ajax Mining Inc., is an 80:20 joint venture between KGHM Polska Miedź S.A. and Abacus Mining and Exploration Corporation. Mineralization is in the Iron Mask batholith, a multi-phase Triassic alkalic intrusive complex. A revised Feasibility Study released in 2016 modelled Ajax as a 65,000 tpd

open-pit mine with a projected 18-year life. In December 2017, the project was denied certification by the British Columbia Ministries of Environment and Climate Change Strategy and Energy, Mines and Petroleum Resources. In June 2018, Natural Resources Canada, Fisheries and Oceans Canada, and the Canadian Coast Guard denied federal certification. Although KGHM Ajax has not announced plans for the site, Abacus issued an update stating that the project remains a priority and that they have begun re-engaging those potentially affected by it and considering whether to reapply for environmental certification. With a Kamloops office that opened in 2020, KGHM is considering resubmitting an application.

6.1.2. Cariboo Gold (Osisko Development Corp.)

Osisko Development Corp. acquired the **Cariboo Gold** project in 2019 through a purchase of Barkerville Gold Mines. The property consolidates several historic gold mines. The company project engaged in the British Columbia environmental assessment process in 2019, and the application is now in the development and review phase. The current project description is for a 4750 tpd underground mine with a 16-year life. Ore crushing, sorting, and a flotation circuit on site would produce

Table 3. Selected proposed mines or quarries, South Central Region.

Project	Operator (partner)	Commodity; deposit type; MINFILE	Reserves	Resources	Comments
Ajax	KGHM Ajax Mining Inc. (KGHM Polska Miedź SA 80%, Abacus Mining and Exploration Corporation 20%)	Cu, Au; Alkalic porphyry; 092INE012, 13	P+Pr (NSR cut-off US\$7.10/t): 426 Mt 0.29% Cu, 0.19 g/t Au, 0.39 g/t Ag	M+I (NSR cut-off US\$7.10/t): 568 Mt 0.26% Cu, 0.18 g/t Au, 0.35 g/t Ag	Environmental certification denied by provincial (2017) and federal ministers (2018). Proponents are investigating a possible resubmission.
Cariboo Gold Project	Osisko Development Corp.	Au; Au-quartz veins; 093H 140, 139, 19, 6	na	M+I: 21.441 Mt 4.6 g/t Au Inf: 21.649 Mt 3.9 g/t Au	Updated project description has average production rate of 4750 tpd and mine life up to 16 years. Ongoing exploration drilling.
New Prosperity	Taseko Mines Limited	Cu, Au; Porphyry; 092O 041	P+Pr (NSR cut-off \$5.50/t): 831 Mt 0.23% Cu, 0.41 g/t Au containing (recoverable) 3.6 Blb Cu, 7.7 Moz Au	M+I (cut-off 0.14% Cu): 1010 Mt 0.24% Cu, 0.41 g/t Au	Granted provincial environmental certificate and time extensions but denied federal approval. Taseko and T̓silhqot'in Nation in discussion.
Ruddock Creek	Ruddock Creek Mining Corporation (Imperial Metals 100%)	Pb, Zn, Ag; Broken Hill-type; 082M 082	na	M+I (cut-off 4.0% Pb+Zn): 6.2 Mt 6.50% Zn, 1.33% Pb Inf: 6.678 Mt 6.33% Zn, 1.20% Pb	Project at environmental assessment pre-application stage. Feb 2013 resource before 2018-19 drilling. Imperial Metals now owns 100%.

P = Proven; Pr = Probable; M = Measured; I = Indicated; Inf = Inferred

a flotation concentrate to be trucked to the Quesnel River mill. Tailings would be disposed of as paste backfill on site and at the QR with a filtered stack tailings storage facility. A feasibility study is to be completed in 2022. Measured and Indicated resources stood at approximately 3 Moz with a similar amount in the Inferred category before 2020-21 drilling.

The company is permitted to begin underground development at Cow Mountain, separate from the **Bonanza Ledge Mine** which is on the property and produced in 2021 (see Metal mines section 3.1.1.). This underground development will serve as access for a bulk sample and underground drilling. The company completed 152,000 m of resource conversion and exploration drilling at Cariboo Gold in 2021.

6.1.3. New Prosperity (Taseko Mines Limited)

Taseko Mines Limited's **New Prosperity** project received a 12 month extension of its provincial environmental certificate for a 70,000 tpd open pit copper-gold mine. New Prosperity received provincial certification in 2010 but in 2014 the Government of Canada refused to authorize the project. Taseko has a standstill agreement with the T'silhqot'in Nation pending a dialogue between the parties to arrive at a long-term resolution of differences about the project.

6.1.4. Ruddock Creek (Imperial Metals Corporation 100%)

Imperial Metals Corporation increased its ownership of the **Ruddock Creek** project to 100% by purchasing the interest held by Japanese partners in Ruddock Creek Mining Corporation. Although they reported no 2021 exploration, the project remains in the British Columbia Environmental Assessment process. A 2014 revised project description referred to a 3000 tpd underground lead-zinc mine with an 8-year life. A mineral resource estimate, released in February 2013, reported 6.246 Mt grading 6.5% Zn and 1.33% Pb (Indicated) and 6.678 Mt grading 6.33% Zn and 1.20% Pb (Inferred), using a 4.0% combined Pb+Zn cut-off. This estimate does not incorporate 2018-19 drilling. The deposit is described as sedimentary exhalative, Monashee or Broken Hill-type, in marble, gneiss, and calc-silicate rocks.

6.2. Proposed industrial mineral and aggregate quarries

The proposed quarries in the region are below environmental assessment thresholds, and not treated herein because details are not widely reported.

7. Selected exploration activities and highlights

Exploration spending in 2021 was predominantly for gold, although exploration for porphyry copper remained significant.

7.1. Selected precious metal projects

The South Central Region has many precious metal deposit types including: orogenic veins; transitional veins; epithermal veins; hot spring systems; replacement deposits; skarns; sediment-hosted deposits; and intrusion-related breccias.

7.1.1. Blackdome-Elizabeth (Tempus Resources Ltd.)

Tempus Resources Ltd. drilled at their **Elizabeth** property (7740 m, 28 holes) and reported early highlights of 3.4 m (true thickness) grading 34.4 g/t Au and 1.28 m grading 68.30 g/t Au. A newly discovered vein, which returned 1.0 m grading 33.7 g/t Au and 0.5 m grading 26.4 g/t Au, has been traced along a 380 m strike length. At their **Blackdome** property Tempus conducted an alteration study and identified new target areas. The linked Blackdome and Elizabeth properties were the subject of a 2010 Preliminary Economic Assessment in which mining would occur at both sites, with processing at an existing mill at Blackdome. Tempus is focussed on verifying and expanding the existing resource (Table 4).

Blackdome is a low-sulphidation epithermal deposit in Cenozoic intermediate to felsic volcanic rocks. Elizabeth, 30 km south, is a series of veins in a Paleocene quartz diorite intrusion in the Shulaps ultramafic complex. Historically they have been compared to the Bralorne-Pioneer orogenic deposits.

7.1.2. Blackdome (ArcPacific Resources Corp.)

ArcPacific Resources Corp. reported results of hand trenching at their **Blackdome** epithermal precious metals project (separate from Tempus Resources property of the same name). High values along 1 m intervals of two separate trenches were reported at 5.67 g/t Au and 8.77 g/t Ag, and 7.35 g/t Au and 12.9 g/t Ag.

7.1.3. Bralorne (Talisker Resources Ltd.)

Talisker Resources Ltd. is targeting 100,000 m of drilling at the **Bralorne** mine with plans to prepare a resource estimate in 2022. Drilling for an underground resource is from surface to a depth of about 700 m. They are also developing a near-surface (<350 m deep) bulk-tonnage resource. The company reported numerous narrow high-grade vein intersections, but also notable were longer, lower grade near-surface intersections to be incorporated in a surface resource. They also reported significant intersections of 2.25 m grading 90.71 g/t Au at the BRX target, 5.5 km north of the Bralorne mine and 1.25 m grading 81.09 g/t Au between the Bralorne and Pioneer mines.

Talisker acquired the Bralorne project in 2019 and subsequently assembled a larger contiguous land position in the Bridge River Camp which comprises the Congress and Royale properties. The camp produced more than 4 million oz of gold between 1900 and 1971 at average grades of about 15 g/t Au. Veins have characteristics typical of orogenic gold deposits; the age of mineralization is estimated at ca. 68-64 Ma (⁴⁰Ar/³⁹Ar muscovite; Hart and Goldfarb, 2017). Historical development traced veins to a depth of 1900 m (Church and Jones, 1999).

7.1.4. CHG (Basin Uranium Corp.)

Basin Uranium Corp. (formerly Black Shield Metals Corp.) flew an airborne VTEM geophysical survey at the **CHG** (carbonate hosted gold) project under an option agreement with vendor Cariboo Rose Resources Ltd.

Table 4. Selected exploration projects, South Central Region.

Project	Operator (partner)	Commodity; deposit type; MINFILE	Resources (NI 43-101 compliant unless indicated otherwise)	Comments
Alwin Mine	GSP Resource Corp.	Cu, Ag; Cu±Ag quartz veins; Porphyry Cu±Mo±Au; 092ISW010, 21	Historical: 390,000 t 11.7 g/t Ag, 0.69 g/t Au, 2.5% Cu	Drilling, 8 holes, 2334.5 m; highlight 164.6 m grading 0.61% CuEq (0.5% Cu).
Beaver-Lynx	Inomin Mines Inc.	Ni, Co; Ultramafic-mafic; 093B 073, 285	na	Ground magnetic survey. Drilling 5 holes, 715 m.
Blackdome	ArcPacific Resources Corp.	Au, Ag; Epithermal Au-Ag; 092O 002, 169, 164	I: 144,500 t 11.29 g/t Au, 50.01 g/t Ag Inf: 90,600 t 8.79 g/t Au, 18.61 g/t Ag	Trenching, initial result 36 m 1.03 g/t Au.
Blackdome- Elizabeth	Tempus Resources Ltd.	Au, Ag; Au quartz veins, Epithermal Au-Ag-Cu low sulphidation; 092O 053, 12	Inf: 522,843 t 12.26 g/t Au	Drilling, 7740 m in 28 holes at Elizabeth. New vein discovery. Alteration study at Blackdome.
Bralorne	Talisker Resources Ltd.	Au; Au-quartz veins; 092JNE001	M+I: 260,000 tons 0.351 oz/ ton Au Inf: 317,000 tons 0.231 oz/ton Au	Drilling, 100,000 m planned by year end. Objectives include new surface and underground resource estimates.
Brussels Creek	Recharge Resources Ltd.	Cu, Au, Pd; Porphyry Cu-Au (alkalic); 092INE089	na	TITAN IP survey (announced start).
CHG	Basin Uranium Corp. (Cariboo Rose Resources Ltd.)	Au, Ag; Carbonate-hosted Au; 092P 083	na	Airborne (VTEM) survey, 335 km.
Comstock	North Valley Resources Ltd.	Au, Zn, Pb, Cu, Ag; Polymetallic veins Ag-Pb- Zn±Au; 092ISE052, 156	na	Ground magnetic, soil and rock geochemical surveys. Known base metal, also targeting epithermal mineralization.
Copper Keg	District Copper Corp.	Cu, Au, Ag; Porphyry Cu±Mo±Au; 092INW031	na	Mapping, TITAN IP survey.
Copperview	Golden Lake Exploration Inc.	Cu, Au; Porphyry Cu-Au (alkalic); 092HNE296, 320	na	Prospecting, geological mapping, rock and soil sampling. Airborne VLF EM and magnetic survey. Grab sample returned 9920 g/t Ag.
Dictator	Eagle Plains Resources Ltd.	Au, Ag; Polymetallic veins Ag-Pb- Zn±Au; 082ENE022, 23, 73, 72	na	2020-21 airborne magnetic survey completed. Prospecting, rock and soil geochemistry.
Donna	Eagle Plains Resources Ltd.	Au, Ag; Polymetallic veins; 082LSE022, 10, 20, 16	na	Airborne radiometric and magnetic survey, soil and silt stream geochemistry, drilling 12 holes, 1152 m.

Table 4. Continued.

FG	Karus Gold Corp.	Au, Ag; Au-quartz veins; 093A 061	(2015 estimate considered historical by Karus) M: 5,600,000 t 0.812 g/t Au I: 9,570,000 t 0.755 g/t Au Inf: 27,493,000 t 0.718 g/t Au	Drilling, 7142 m in 19 holes. Technical report.
Fox Tungsten	Happy Creek Minerals Ltd.	W; W skarns; 093A 259, 260, 261, 211	I: 582,000 t 0.826% WO ₃ Inf: 565,400 t 1.231% WO ₃	Drilling, 12 holes, 2052.7 m.
Friendly	Wedgemount Resources Corp.	Cu, Ag, Pt, Pd; Porphyry Cu±Mo±Au; 092P 007, 9, 10, 212	na	Mapping, rock and soil geochemistry, IP (planned).
Gold Bridge	Blackstone Minerals Ltd.	Cu, Ni, Co, Au; 5 element veins?; 092JNE068, 108	na	Drilling commenced at the Jewel target in December. First hole encountered visible Cu-Ni-Co mineralization.
Gold Creek	Karus Gold Corp.	Au, Ag; Au-quartz veins; 093A 127	na	Drilling, 5 holes, 1375 m.
GC	MGX Minerals Inc.	Li, Cs, Ta, Rb; LCT pegmatite	na	Announced field work late in the year.
Goldrange	Kingfisher Metals Corp.	Au, Ag; Au and Cu±Ag quartz veins; 092N 058, 59, 47, 57, 48	na	14 holes, 4925.3 m drill program. Highlight 9 m of 6.88 g/t Au, 13.6 g/t Ag, 0.28% Cu.
Highland Valley project (West Valley-Rateria)	Happy Creek Minerals Ltd.	Cu, Mo, Au, Ag, Re; Porphyry Cu±Mo±Au; 092ISE199	na	Airborne magnetic survey, surface mapping and sampling.
Hedge Hog	West Oak Gold Corp.		na	Soil survey. Targeting gold mineralization.
Homathko	Homerun Resources Inc.	Au, Ag; Au quartz veins, Cu±Ag quartz veins; 092N 049, 67, 68	na	Increased property size, airborne magnetic survey.
Iron Lake	Tech-X Resources Inc.	Pt, Pd, Co, Cu, Au; Alkalic porphyry Cu-Au and ultramafic hosted; 092P 132, 113, 182, 222	na	Private company does not release details of work.
Koster Dam	Cariboo Rose Resources Ltd. (Ameriwest Lithium Inc.)	Au, Ag; Au and Cu±Ag quartz veins; 092O 031	na	Airborne magnetic and lidar survey.

Table 4. Continued.

Lac La Hache	Engold Mines Ltd.	Cu, Au, Ag, Fe; Alkalic porphyry Cu-Au, Cu skarn; 092P 120, 108, 2, 153	Aurizon Inf: 1.99 Mt 2.32 g/t Au, 0.6% Cu, 5.37 g/t Ag Spout zone open pit I: 6.5 Mt 0.33% Cu, 1.34 g/t Ag, 0.05 g/t Au, 11.62% magnetite Spout zone open pit Inf: 7.66 Mt 0.27% Cu, 0.99 g/t Ag, 0.04 g/t Au, 9.5% magnetite Spout zone u/g Inf: 0.39 Mt 1.0% Cu, 2.58 g/t Ag, 0.13 g/t Ag, 10.33% magnetite G1 u/g Inf: 1.71 Mt 1.25% Cu, 6.45 g/t Ag, 0.19 g/t Au, 30.94% magnetite	Drilling (5277.4 m) at Ann North, G1, G1 south and Road Gold zone. Updated resource estimates, maiden resource for G1.
Lightning Strike	Cariboo Rose Resources Ltd.	Au, Ag; Au-quartz veins; 093A 250	na	Drilling 1463 m, 11 holes. Targets are sediment-hosted gold veins.
LMSL	ArcPacific Resources Corp.	Cu, Au, Mo, W; Porphyry Cu±Mo±Au, W skarn; 092ISE027, 94, 128, 129	na	Data review, drill targets selected, permitting, expanded property.
Miner Mountain	Sego Resources Inc.	Cu, Au; Alkalic porphyry Cu-Au; 092HSE203, 78	na	Drilling, 2200 m in 11 holes. Highlights include 59 m 1.03 g/t Au, 88 m 1.08 g/t Au, and 94.2 m of 0.86 g/t Au.
Mouse Mountain	Omineca Mining and Metals Ltd.	Cu, Au, Ag; Alkalic porphyry Cu-Au; 093G 003	na	Completed 2000 m drilling, earned 50% interest in the project.
MPD	Kodiak Copper Corp.	Cu, Au; Alkalic porphyry Cu-Au; 092HNE243, 55, 191, 244	na	Drilled 21,675 m of a planned approx. 30,000 m before weather related suspension. Highlights include 504 m 0.37% Cu, 0.15 g/t Au, 1.11 g/t Ag at Gate zone.
New Craigmont	Nicola Mining Inc.	Cu, Au; Cu skarn; 092ISE035	Inf: 18.669 Mt 0.13% Cu (waste rock)	1460 m drilling in 5 holes. Highlights 11.5 m 2.19% Cu and 71.35 m 0.29 % Cu.
New Pilot	Nexus Gold Corp.	Au, Ag, Cu Zn, Pb; Au quartz veins, Cu±Ag quartz veins; 092JNE076, 197	na	Airborne magnetic and radiometric survey.
Newton	Carlyle Commodities Corp.	Au, Ag; Epithermal Au-Ag-Cu (high sulphidation)	Inf: 111.46 Mt 0.44 g/t Au, 2.1 g/t Ag	New owner Carlyle to update the 2012 resource estimate.

Table 4. Continued.

Perk-Rocky	Ethos Gold Corp.	Cu, Au, Ag; Porphyry Cu, Au quartz veins; 092N 011, 12, 53	na	Wide spaced reconnaissance drilling (2050 m, 6 holes) intersected anomalous Cu and alteration.
Placer Mountain	Damara Gold Corp.	Au, Ag; Au quartz veins; 092HSE262, 263	na	Soil geochemical survey, trenching, rock sampling drilling (2000 m planned).
Ponderosa	Au Gold Corp.	Au, Ag; Au-quartz veins; 092ISE192	na	Rock and soil geochemistry, airborne magnetic survey.
Quesnel Nickel	Green River Gold Corp.	Ni, Co, talc; Mafic-ultramafic; 093A 130, 093H 061, 139	na	Packsack drilling to average depth approx. 1.5 m.
Rabbit North	Tower Resources Ltd.	Cu, Au; Alkalic porphyry Cu-Au; 092INE045, 147	na	Infill till sampling identified drill target. Drilling commenced in December.
Rayfield	Golden Sky Minerals Corp.	Cu,Au; Alkalic porphyry Cu-Au; 092P 005	na	Soil (1337) and rock (29) geochemistry.
Reliance	Endurance Gold Corporation	Au, Sb, Ag; Au quartz veins, Stibnite veins and disseminations; 092JNE033, 136, 191	Historical: 410,916 t grading 5.96 g/t Au	Reverse circulation drilling (35 holes, highlight 15.24 m 14.08 g/t Au), IP and 4329 m (22 holes) diamond drilling. Initial results 5.4 m 10.94 g/t Au, 9 m 7.49 g/t Au.
Shovelnose	Westhaven Gold Corp.	Au, Ag; Epithermal Au-Ag-Cu low sulphidation; 092HNE309, 308	na	Drilling, approximately 41,000 m before drilling suspended. Metallurgical testing.
Spanish Mountain	Spanish Mountain Gold Ltd.	Au, Ag; Au-quartz veins; 093A 043	M+I: 294 Mt 0.50 g/t Au, 0.72 g/t Ag Inf: 18 Mt 0.63 g/t Au, 0.76 g/t Ag	Prefeasibility study, sonic drilling (1226 m, 21 holes). P+Pr: 95.9 Mt 0.76 g/t Au, 0.71 g/t Ag.
Spences Bridge and Regional	Talisker Resources Ltd.	Au, Ag; Epithermal Au-Ag-Cu low sulphidation; 092O 054, 60, 143, 092INW092, 110, 092ISW118, 124, 84	na	Regional prospecting mapping and sampling program continued in 2021 over multiple targets.
Spitfire-Sunny Boy	Falcon Gold Corp.	Au, Ag, Cu; Polymetallic veins, epithermal?; 092ISE049, 48, 118, 119, 117	na	Packsack drilling highlights 0.86 m of 29.7 g/t Au, 0.47 m 68.7 g/t Au. Grab samples up to 168 g/t Au.
Spius	Arctic Fox Ventures Inc. (Pacific Ridge Exploration Ltd.)	Cu, Mo; Porphyry Cu±Mo±Au; 092HNW027, 85	na	Drilling 550 m.
Vidette Lake	Kermode Resources Ltd.	Au, Ag, Cu; epithermal; no MINFILE	na	Soil geochemistry and ground magnetic survey.

Table 4. Continued.

Wingdam	Omineca Mining and Metals Ltd.	Au; Au-quartz veins; 093H 012	na	Drilling, targeting approximately 8000 m, 27 holes (continuation of 2020 program).
Woodjam	Consolidated Woodjam Copper Corp.	Cu, Au; Alkalic porphyry Cu-Au; 093A 269, 78	Inf: 227.5 Mt 0.31% Cu (Woodjam South) Inf: 32.8 Mt 0.22% Cu, 0.49 g/t Au (Deerhorn) Inf: 8.3 Mt 0.22% Cu, 0.26 g/t Au (Takom)	Drilling 4000 m (planned) at Deerhorn. Early released highlight 142.4 m 0.56% Cu, 0.23 g/t Au.
Yellowhead	Taseko Mines Limited	Cu, Au, Ag; Noranda/Kuroko; 082M 008, 9	M+I: 1292 Mt 0.25% Cu, 0.028 g/t Au, 1.2 g/t Ag Inf: 109 Mt 0.21% Cu, 0.024 g/t Au, 1.2 g/t Ag	Engineering and baseline environmental work. Community engagement. Proven+Probable reserves are 817 Mt grading 0.28% Cu.

M = Measured; I = Indicated; Inf = Inferred

7.1.5. Comstock (North Valley Resources Ltd.)

North Valley Resources Ltd. announced ground magnetic and soil and rock geochemical surveys at the **Comstock** property, where targets include volcanogenic massive sulphide and vein-hosted polymetallic and epithermal precious metals mineralization.

7.1.6. Dictator (Eagle Plains Resources Ltd.)

Eagle Plains completed a 2020-21 airborne magnetic survey and subsequently carried out rock and soil geochemistry and prospecting at **Dictator**. Targets include intrusion-related precious and base metals.

7.1.7. Donna (Eagle Plains Resources Ltd.)

Eagle Plains Resources Ltd. completed 1152 m of drilling in 12 holes at **Donna**. A highlight intersection was reported at 1.5 m grading 9.41 g/t Au. Surface work included soil and silt geochemistry following up 2020-21 airborne radiometric and magnetic surveys. Targets include intrusive-related gold mineralization.

7.1.8. FG (Karus Gold Corp.)

The **FG** project targeted orogenic gold mineralized quartz veins in sedimentary rocks with 7142 m drilling in 19 holes. Karus was a spin-off company of Kore Mining Ltd. created to hold and operate the company's Cariboo gold projects and is targeting higher-grade mineralization than previous exploration. The Main zone lies in metasedimentary rocks on the northeast limb of a syncline. They propose other targets in equivalent rocks on this structure.

7.1.9. Gold Creek (Karus Gold Corp.)

Karus Gold Corp. carried out drilling at the **Gold Creek**

(1375 m in 5 holes) project. They are targeting high-grade mineralization in gold-bearing quartz-carbonate sheeted veins northwest of the Spanish Mountain project.

7.1.10. Goldrange (Kingfisher Metals Corp.)

Kingfisher Metals Corp. drilled 4925 m in 14 holes at the **Goldrange** project, which had hitherto seen little modern exploration. Highlight results include a 9 m intersection grading 6.88 g/t Au, 13.6 g/t Ag, and 0.28% Cu in a hydrothermal breccia. One vein returned 1 m of 14.8 g/t Au. Work also included geochemical and IP surveys.

7.1.11. Hedge Hog (West Oak Gold Corp.)

West Oak Gold Corp. optioned the **Hedge Hog** property and began exploration for gold mineralization. Work included soil geochemistry. Hedge Hog has been explored previously as a VMS target.

7.1.12. Homathko (Homerun Resources Inc.)

Homerun Resources Inc. expanded their **Homathko** property land package and flew an airborne magnetic survey (521 line-km) across the expanded property.

7.1.13. Koster Dam (Cariboo Rose Resources Ltd.)

Cariboo Rose reported an airborne survey (magnetic and lidar) at the **Koster Dam** property. Ameriwest Lithium Inc. has a 45% interest under an option agreement.

7.1.14. Lac La Hache (Engold Mines Ltd.)

Engold Mines Ltd. drilled their Road Gold zone, reporting an intersection of 1.5 m grading 7.6 g/t Au. They also reported work on skarn and porphyry targets on their **Lac La Hache** property (see below).

7.1.15. Lightning Strike (Cariboo Rose Resources Ltd.)

Cariboo Rose Resources Ltd. reported trenching and 1463 m of drilling at their **Lightning Strike** project. The target is shale-hosted gold similar to Spanish Mountain and FG.

7.1.16. New Pilot (Nexus Gold Corp.)

Nexus Gold Corp. completed an airborne magnetic and radiometric survey at the **New Pilot** project, outlining a magnetic low.

7.1.17. Newton (Carlyle Commodities Corp.)

Carlyle Commodities Corp. acquired the **Newton** gold property from Amarc Resources Ltd. and plan to update the property's 2012 resource estimate. They applied for a permit to allow drilling.

7.1.18. Placer Mountain (Damara Gold Corp.)

Damara reported soil geochemistry surveys, trenching, and drilling at its **Placer Mountain** project (formerly Princeton Gold). The planned 2000 m program commenced late in the fall. Grab samples returned up to 70.6 g/t Au and 244 g/t Ag. A 400 by 1200 m gold-in-soil anomaly had individual samples grading up to 18,067 ppb Au and 52.1 g/t Ag.

7.1.19. Ponderosa (Au Gold Corp.)

Au Gold Corp. conducted rock and soil sampling and airborne magnetic and photogrammetry surveys at their **Ponderosa** project in the Spences Bridge belt. They have applied for a permit to allow drilling and trenching. The targets are epithermal precious metals occurrences.

7.1.20. Reliance (Endurance Gold Corporation)

Endurance Gold Corporation conducted an IP geophysical survey, reverse circulation drilling, and diamond drilling at the **Reliance** project, focussing on the Eagle zone, where 2020 and 2021 returned several high-grade intersections, including 15.24 m grading 14.08 g/t Au.

Endurance Gold Corporation reported 4329 m diamond drilling (22 holes) in addition to reverse circulation drilling (35 holes), and surface exploration. Initial diamond drilling results included 5.4 m grading 10.94 g/t Au and 9.0 m grading 7.49 g/t Au at the Eagle zone.

The Reliance targets are orogenic gold veins in shear zones in volcanic rocks and cherts of the Bridge River complex. The property has an historical resource of 410,916 t grading 5.96 g/t Au.

7.1.21. Shovelnose (Westhaven Gold Corp.)

Westhaven Gold Corp. focussed on its **Shovelnose** project in the Spences Bridge gold belt with 41,000 m of drilling completed. The planned drilling was substantially completed before being suspended in November due to flooding in Merritt. In addition to step out and infill drilling at the South zone, they tested more recently discovered zones along the mineralized trend. One objective is an initial resource estimate for the

South zone early in 2022. Preliminary metallurgical testing demonstrated 95% recovery of gold and 96% recovery of silver in South zone quartz veins. Drilling highlights at the South zone include: 85.45 m grading 1.09 g/t Au and 2.43 g/t Ag including 3.14 m grading 10.8 g/t Au, and 24.8 g/t Ag; 76.33 m grading 2.93 g/t Au and 11.3 g/t Ag including 2 m grading 26.6 g/t Au and 98.37 g/t Ag; 41.55 m grading 8.17 g/t Au and 34.64 g/t Ag including 0.45 m grading 614 g/t Au and 2070 g/t Ag.

7.1.22. Spanish Mountain (Spanish Mountain Gold Ltd.)

Spanish Mountain Gold Ltd. completed a Prefeasibility study on its **Spanish Mountain** sediment-hosted vein gold project and continued with project optimization, environmental assessment, and sonic drilling (1226 m in 21 holes). The company withdrew the project from the environmental assessment process in 2019. The study, with an effective date of May 10, estimated Proven and Probable reserves of 95.9 Mt grading 0.76 g/t Au and 0.71 g/t Ag for 2.34 Moz Au. The main zone reserves would supply a 20,000 tpd open-pit operation with a 14-year life.

The deposit consists of disseminated gold in graphitic argillite and gold-bearing quartz veins in siltstone, greywacke, and tuff. Host rocks are Upper Triassic and mineralization is Late Jurassic, older than that at the **Cariboo Gold** project (Allan et al., 2017).

7.1.23. Spences Bridge and Regional (Talisker Resources Ltd.)

Talisker reported ongoing work at its **Spences Bridge** and **Remington** greenfields projects. A team of 20 geologists undertook mapping and geochemical sampling across multiple targets, including Nova and Cyclone, at which they report epithermal-style quartz veins. Remington, Dora, and Lola are among other active properties in the area. The company received a permit to drill at Dora.

7.1.24. Spitfire-Sunny Boy (Falcon Gold Corp.)

Falcon Gold Corp. following up 2020 sampling at the **Spitfire-Sunny Boy** project with packsack drilling. Highlights included 0.47 m grading 68.7 g/t Au, and 11.8 g/t Ag, and 0.86 m grading 29.7 g/t Au and 2.1 g/t Ag. A grab sample returned 168 g/t Au, 17.5 g/t Ag, and 0.7% Cu. Falcon Gold also acquired the Gaspard gold project and reported reconnaissance mapping and geochemical sampling.

7.1.25. Vidette Lake (Kermode Resources Ltd.)

Kermode Resources Ltd. expanded their **Vidette Lake** gold property and conducted soil sampling and ground magnetic surveys before work was interrupted by a wildfire.

7.1.26. Wingdam (Omineca Mining and Metals Ltd.)

Omineca Mining and Metals Ltd.'s **Wingdam** project saw 8000 m of surface drilling in 2020-21, exploring for bedrock sources from which placer gold was derived. In addition to drilling, work included rock, soil and stream sediment sampling

and magnetic surveys. The underground placer bulk sampling program also proceeded with dewatering and rehabilitation ahead of underground development.

7.2. Selected porphyry projects

Although the focus of financing and exploration in 2021 largely centred on gold, porphyry copper projects also saw advances. Kodiak Copper continued a major drill program at **MPD**, and work continued at **Miner Mountain**, **Woodjam**, and the **Highland Valley** project, and near mine sites described above.

7.2.1. Alwin Mine (GSP Resource Corp.)

GSP Resource Corp. drilled at the **Alwin Mine** project. Highlights of the first phase of 2021 drilling (1439 m) included 164.6 m grading 0.61% CuEq (0.5% Cu, + Ag, Au, Mo, Re). They remobilized in the fall for an additional 896 m.

Between 1916 and 1981, exploration targeted high-grade mineralization described as replacement type and of limited extent. However, the 2021 program encountered potentially larger zones of lower grade material.

7.2.2. Brussels Creek (Recharge Resources Ltd.)

Recharge Resources Ltd. (formerly Le Mare Gold Corp.) reported a Titan IP survey at **Brussels Creek**. The target is alkalic porphyry mineralization similar to New Afton.

7.2.3. Copper Keg (District Copper Corp.)

District Copper Corp. conducted mapping at **Copper Keg** in April. An IP survey was planned for later in the year. Porphyry mineralization is the target.

7.2.4. Copperview (Golden Lake Exploration Inc.)

Golden Lake Exploration conducted mapping, prospecting, soil and rock geochemistry, and an airborne electromagnetic (VLF EM) and magnetic survey at **Copperview**. Grab samples from historical trenches returned up to 9920 g/t Ag and 5900 g/t Ag.

7.2.5. Friendly (Wedgemount Resources Corp.)

Wedgemount Resources Corp. reported geological and geochemical work at **Friendly**, an early-stage project with porphyry, skarn, and other target types.

7.2.6. Highland Valley (Happy Creek Minerals Ltd.)

Happy Creek Minerals Ltd. flew an airborne magnetic survey at its **Highland Valley** (Rateria and West Valley properties) project and followed up with surface mapping and sampling.

7.2.7. Lac La Hache (Engold Mines Ltd.)

Engold Mines Ltd. drilled deep holes at the Ann North and G-1 south porphyry targets on their **Lac La Hache** project, encountering visible mineralization and alteration, including potassic alteration. Two holes had been completed at Ann North as of December. While G-1 is a skarn target, drilling

encountered disseminated mineralization to the southeast which they continue to explore.

7.2.8. LMSL (ArcPacific Resources Corp.)

ArcPacific Resources Corp.'s **LMSL** project is an amalgamation of the Lucky Mike and Silver Lode properties. Targets include silver-lead zinc mineralization in veins and skarns. Data compilation revealed porphyry-style alteration and geochemical signatures and identified drill targets.

7.2.9. Miner Mountain (Sego Resources Inc.)

Miner Mountain has several alkalic porphyry Cu-Au and Au targets in a roughly 2 by 3 km area, much of which is buried by drift (see Britten et al., 2020). The Southern gold zone is a gold rich target at the southern end of the property.

Sego drilled its Southern gold zone, with highlights including 59 m grading 1.03 g/t Au, 88 m grading 1.08 g/t Au, and 94.2 m grading 0.86 g/t Au. Drilling was continuing at the end of November, interrupted briefly by weather. Total drilling was approximately 2200 m.

7.2.10. Mouse Mountain (Omineca Mining and Metals Inc.)

Omineca Mining and Metals drilled 2000 m at the **Mouse Mountain** project, an alkalic porphyry Cu-Au prospect which has been explored intermittently since a 20 t bulk sample was taken in 1956. The drilling satisfied terms of an option agreement which gives Omineca a 50% interest in the project.

7.2.11. MPD (Kodiak Copper Corp.)

Kodiak undertook a 30,000 m (planned) drill program at its **MPD** project. They completed 21,675 m before suspending work in response to flooding in nearby Merritt. Positive results included 504 m grading 0.37% Cu, 0.15 g/t Au, 1.11 g/t Ag at Gate zone and a step out (242 m grading 0.38% Cu, 0.22 g/t Au, 0.63 g/t Ag), which extended the zone by several hundred metres. The Gate zone was a 2019-20 discovery. Drilling was scheduled to move to the Dillard target before the interruption. MPD is a consolidation of the Man, Prime, and Dillard alkalic porphyry Cu-Au targets, which had historically been explored to about 200 m depth.

7.2.12. Perk-Rocky (Ethos Gold Corp.)

Ethos Gold Corp. reported a 2050 m, wide-spaced reconnaissance drill program at the **Perk-Rocky** porphyry copper-gold project. Five of six holes intersected advanced argillic alteration and anomalous copper values consistent with a porphyry system.

7.2.13. Rabbit North (Tower Resources Ltd.)

An infill till geochemical survey identified a gold dispersal train and a drill target, under cover at **Rabbit North**. Drilling of a planned seven-site program began in December. They expect to complete 3 holes in 2021. The known targets at Rabbit North are porphyry Cu-Au type.

7.2.14. Rayfield (Golden Sky Minerals Corp.)

Golden Sky acquired the **Rayfield** Property in 2021 and conducted an initial soil and rock geochemical survey (1337 soil and 29 rock). The target is porphyry Cu-Au mineralization. The Rayfield River pluton (Late Triassic) underlies the property.

7.2.15. Spius (Arctic Fox Ventures Inc.)

Pacific Ridge Exploration Ltd. reported 550 m of drilling at the **Spius** porphyry copper project, funded by optionee Arctic Fox Ventures Inc.

7.2.16. Woodjam (Consolidated Woodjam Copper Corp.)

Woodjam comprises six zones in a cluster approximately 5 km in diameter. Early results from a planned 4000 m of drilling included 142.4 m grading 0.56% Cu and 0.23 g/t Au at the Southeast zone. Consolidated Woodjam Copper Corp. also drilled at the Deerhorn zone and an IP target at the Megaton. The Deerhorn zone has an Inferred resource of 32.8 Mt at 0.49 g/t Au and 0.22% Cu (Table 4). Mineralization exhibits both alkaline and calc-alkaline characteristics (del Real et al., 2020).

7.3. Selected polymetallic base and precious metal projects

The region has numerous polymetallic massive sulphide prospects, including those hosted by the Eagle Bay assemblage (e.g., Samatosum, Rea, Yellowhead) and other Paleozoic strata.

7.3.1. Yellowhead (Taseko Mines Limited)

In an effort to restart environmental assessment for **Yellowhead**, a feasibility-stage bulk-tonnage copper project, Taseko Mines is focussing on advancing into the environmental assessment process through engineering work and engagement with local communities including First Nations. The company is also collecting baseline data and developing models that will be used to support environmental assessment and permitting. Taseko announced results of an updated Feasibility Study in 2020, including a new development plan and resource estimate (Table 4). Proven and Probable reserves now stand at 817 Mt grading 0.28% Cu at a 0.17% cut-off.

Although porphyry-like in tonnage and grade, Yellowhead is generally considered a marine volcanogenic and syngenetic deposit. It is hosted by metavolcanic and metasedimentary rocks of the Eagle Bay assemblage (Lower Cambrian to Mississippian).

7.4. Selected skarn projects (tungsten, copper, gold)

Historically, copper skarns have been important sources of high-grade ore. One, the Craigmont mine, has been reactivated as the **New Craigmont** exploration project. One tungsten skarn project, **Fox Tungsten**, has recently been active.

7.4.1. Fox Tungsten (Happy Creek Mineral Ltd.)

Happy Creek Minerals Ltd. completed 12 holes (2052 m) at the **Fox Tungsten** skarn project. Drilling stepped out from known mineralization and infilled at the Nightcrawler-Creek

zone. Eleven holes intersected tungsten-bearing skarn, with scheelite identified in core. Prospecting identified new areas.

7.4.2. Lac La Hache (Engold Mines Ltd.)

Among other porphyry and gold targets, Engold Mines Ltd. drilled the G-1 target at **Lac La Hache**. Earlier in the year, Engold announced an Inferred resource at G-1 of 1.71 Mt grading 1.25% Cu, 6.45 g/t Ag, 0.19 g/t Au, and 30.94% magnetite.

7.4.3. New Craigmont (Nicola Mining Inc.)

Nicola Mining Inc. reported results from 1460 m of drilling (5 holes) at their **New Craigmont** project. Highlights included 11.5 m grading 2.19% Cu and 71.35 m grading 0.29% Cu, both within longer mineralized intervals. The company is conducting surface work while awaiting a permit for further drilling.

7.5. Selected mafic- and ultramafic-hosted projects

The South Central Region saw several early-stage Ni-Co projects hosted by, or spatially related to, mafic and ultramafic rocks.

7.5.1. Beaver-Lynx (Inomin Mines Inc.)

Inomin Mines Inc. carried out a ground magnetic survey and drilled 715 m in five holes at the **Beaver-Lynx** nickel-cobalt project. The target is disseminated sulphide nickel and cobalt mineralization. They reported visible mineralization.

7.5.2. Gold Bridge (Blackstone Minerals Limited)

Blackstone announced the start of drilling at the Jewel prospect on their **Gold Bridge** project at the end of November. The first hole intersected visible Cu-Ni-Co sulpharsenide mineralization. Jewel is a Au-Cu-Ni-Co target the company believes may be analogous to deposits of the Bou Azzer district in Morocco, which hosts primary cobalt producers exploiting lenses and veins of Ni-Co-Fe arsenide minerals.

7.5.3. Iron Lake (Tech-X Resources Inc.)

Tech-X Resources Inc. optioned **Iron Lake**, a Cu-Au-Pd and Cu-Co-Ni project. Mafic-ultramafic magmatic sulphide deposits are targets as is gold mineralization at the southeastern extent of the property. A private company, Tech-X have not reported details of their work.

7.5.4. Quesnel Nickel (Green River Gold Corp.)

Green River Gold reported exploration at their Fontaine gold property and the adjacent **Quesnel Nickel** project. The company reported packsack drilling at Quesnel Nickel targeting nickel cobalt and talc mineralization.

7.6. Specialty metals

Significant new work on pegmatite, carbonatite or alkaline intrusion related specialty metals targets was not reported. However, MGX Minerals Inc. announced renewed investigation of its properties.

7.6.1. GC (MGX Minerals Inc.)

MGX Minerals Inc. announced it would be conducting exploration at its GC property and reviewing data for the REN property. GC hosts lithium-caesium-tantalum (-rubidium) bearing pegmatites. Drilling at REN returned niobium tantalum-titanium-rubidium results in 2018.

7.7. Industrial minerals

Although work on industrial minerals projects was permitted and reported to regulators, information is not generally made public.

8. Geological research

Lett and Paulen (2021a, b) published a compilation of soil and till geochemical data for two mineral properties in the South Central region, the Ace, a massive sulphide and quartz vein showing, and Getty South a porphyry copper prospect. Schiarizza et al. (2022) conducted a conodont and detrital zircon geochronologic study across the Salmon River unconformity southeast of Kamloops. Van Wagoner and Ootes (2022) examined the geology and geochemistry of the Kamloops Group (Eocene) in its type area; the full geochemical dataset for this study was provided by Van Wagoner et al. (2021). Rubino et al. (2021) integrated detrital zircon and Hf isotopic data to establish the provenance and paleogeographic evolution of Eocene intermontane basin deposits and consider the nature of the crust from which magmatic source rocks were derived. Spence et al. (2022) combined field mapping and remotely piloted aircraft-derived imagery to better understand the magmatic and structural relationships of rocks in the Tulameen ultramafic-mafic Alaskan-type intrusion. Arnold (2021) compiled a depth-to-bedrock dataset for the Interior Plateau from Williams Lake to MacKenzie. Ledoux and Hart (2021) started to investigate the porphyry fertility of the southern Quesnel arc with a literature review and descriptions of samples collected for analytical work. Lee et al. (2021) provided a new U-Pb zircon age for the Guichon Creek batholith and used trace element compositions of zircons to identify changes in magma composition coincident with copper mineralization. Jackaman et al. (2021) published reanalyses of archived till samples in parts of the NTS 93 map sheet, a study area that overlaps the South Central and North Central regions.

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