



MINISTRY OF ENERGY, MINES AND NATURAL GAS

www.empr.gov.bc.ca/geology

Regional Geologist Summaries

EXPLORATION AND MINING IN BRITISH COLUMBIA 2012



New 5 Year
Index Included



Ministry of
Energy, Mines
and Natural Gas

Regional Geologist Summaries
EXPLORATION AND MINING
in British Columbia 2012

EXPLORATION AND MINING IN THE OMINECA REGION, BRITISH COLUMBIA

By **C. Paul Jago, M.Sc., GIT**,
Regional Geologist, Prince George

1.1 SUMMARY AND TRENDS

Mineral exploration in north-central BC had a varied focus in 2012. Exploration included: epithermal gold-silver in the Nechako Plateau and Toodoggone Region; nickel alloy in the Cache Creek Terrane; copper-gold porphyry in the Quesnel Terrane and Toodoggone; and zinc-lead-silver and niobium-enriched carbonatite along the Ancestral North American margin. Exploration was particularly intense in the Nechako Plateau and Toodoggone Region. Juniors companies with copper-gold projects in the Quesnel Terrane reported financing challenges in an adverse market, and several projects were put on hold in favour of flagship projects elsewhere. Some commenced programs later in the year. Molybdenum-copper projects in the Nechako Plateau saw limited work. Despite these challenges, year-on-year total exploration expenditure for the region more than doubled in 2012 (2.29 times) to \$163.5 million with substantial investment coming from advanced stage projects. Drilling also increased by a factor of 1.86 to 301 672 m.

Exploration highlights in alphabetical order of project included

- completion of Preliminary Economic Assessment (PEA) studies for **Blackwater** (New Gold Inc), and **Angus** (Stikine Energy Corp);
- initial or updated resource estimates for **3Ts** (Independence Gold Corp), **Akie** (Canada Zinc Metals Corp), **Aley** (Taseko Mines Ltd), **Decar** (First Point Minerals Corp under option to Cliffs Natural Resources Inc), **Lorraine** (Lorraine Copper Corp under option to Teck), and **MAC** (Stratton Resources Inc);
- and drilling programs, here listed by targeted deposit-type(s):

Porphyry (copper-gold): **Choo** (Serengeti Resources Inc under option to Freeport-McMoran of Canada Ltd), **Kwanika** (Serengeti Resources Inc), **Mex** (Cascadero Copper Corp under option to Gold Fields), **Tagai** (Strategic Metals Ltd), **Tchentlo** (Serengeti Resources Inc under option to Freeport-McMoran of Canada Ltd);

Low-sulfidation epithermal or vein (gold-silver): **3Ts** (Independence Gold Corp), **Big Bear** (Parlane Resource Corp), **Blackwater** (New Gold Inc), **Blackwater East/Northeast** (RJK Explorations Ltd), **Capoose** (New Gold Inc), **Copley** (Northern Vertex Mining Corp in joint venture with Kootenay Silver Inc), **JD** (Tower Resources Ltd), **Ruby** (Brocade Metals Corp), **Trout** (Venerable Ventures Ltd), **Zakco** (Strategic Metals Ltd);

Porphyry and/or Low-sulfidation epithermal: **Bandit** (Stina Resources Ltd under option to Copper Creek Gold Corp), **Hubble** (Amarc Resources Ltd), **Key** (Troymet Exploration Corp);

Nickel-alloy (awaruite): **Decar** (First Point Minerals Corp under option to Cliffs Natural Resources Inc), **Klow** (First Point Minerals Corp);

Carbonatite (niobium): **Aley** (Taseko Mines Ltd);

Sedimentary Coal (anthracite): **Groundhog** (Atrum Coal);

Industrial Mineral (magnesium): **Hoof** (Porpoise Bay Minerals Ltd).

1.1.1 Summary Figures and Tables

Figure 1.1 shows locations of mines and major exploration projects discussed in this report. Figure 1.2 provides a year-on-year comparison of exploration expenditures for the last three years. Figure 1.3 sets out the approximate allocation of 2012 expenditures among Grassroots, Early stage, Advanced stage, and Mine Evaluation exploration in the region. Figure 1.4 compares annual drilling statistics. Table 1.1 gives mine production tonnage in 2011 and reserves. Table 1.2 lists details of the major exploration programs in 2012. Placer exploration and mining, although a significant traditional and ongoing activity in the region, are not included in this report.

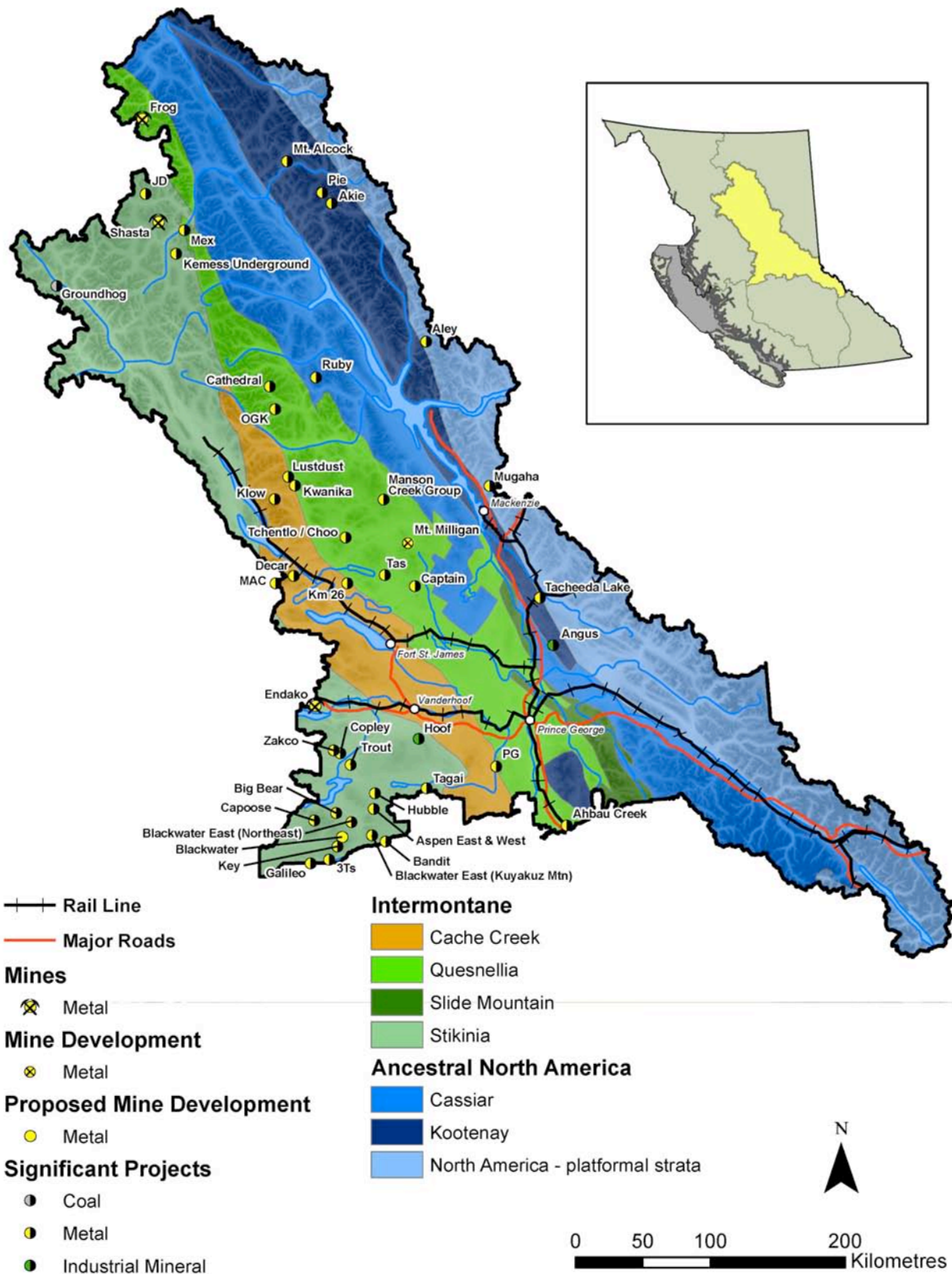


Figure 1.1. Mines and Major Exploration Projects, Omineca Region, 2012.

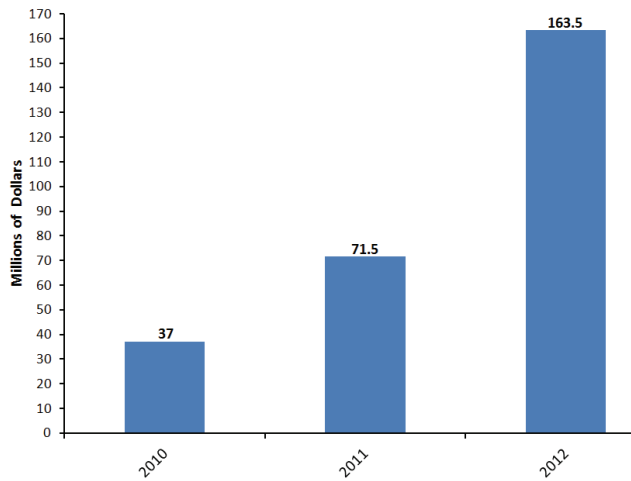


Figure 1.2. Annual exploration spending estimates in millions of dollars, Omineca Region (including three years data since redefining of the regional boundary for the 2010 report).

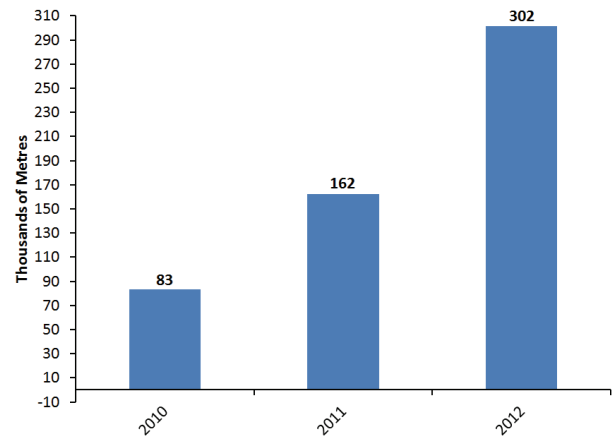


Figure 1.4. Annual exploration drilling estimates in thousands of metres, Omineca Region (including three years data since redefining of the regional boundary for the 2010 report).

1.2 MINES

1.2.1 Molybdenum

1.2.1.1 Nechako Plateau

Thompson Creek Metals (operator and 75% owner) and Sojitz Corp's (25% owner) **Endako Mine**, 17 km west of Fraser Lake, had a challenging year due to falling molybdenum prices, temperamental equity markets and rising operating costs (Figure 1.5). A staged start-up of the

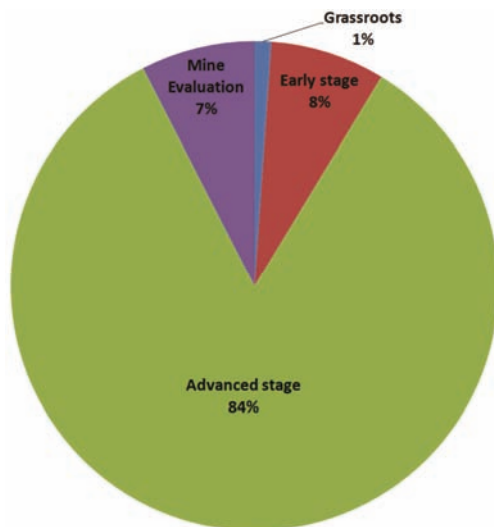


Figure 1.3. Exploration expenditures in 2012 by exploration stage (Grassroots: initial reconnaissance; Early stage: focused work on a target; Advanced stage: resource delineation, PEA and Prefeasibility; Mine Evaluation: focus on EA certificate, Feasibility studies, social license and government approval). Year-on-year, the Advanced stage category increased by 8%, whereas Grassroots decreased by 8%.

new mill began in January, and commercial production was achieved in early February. Construction of the regrind circuit and pebble crusher was completed in late March, and the mill reached design capacity throughput. The mill is designed to increase throughput levels by 77% to 52 000 tonnes/d, increase yearly input levels to 6.8 - 7.3 million kg (15 - 16 million lbs), and reduce operating costs. Concentrate and recovery grades were expected to reach design capacity in the second quarter. Expected recovery from the mill is 80%, with a final concentrate product of 91.5% MoS₂. The mine also added two new haulage trucks. Total capital expenditure for the Endako expansion is estimated at \$650-655 million, with \$62 million locked-in for 2012.

In early May, the company reported an operating loss reflecting a year-on-year 57.3% drop in production and higher start-up and commissioning costs of the new mill. In June, recovery was not meeting design specifications, and a team of outside experts and internal technical specialists evaluated the situation. Additionally, lower ore grade than expected was reported and budgeted levels for the second quarter were not met. To increase production and recovery rates, and decrease costs, in July the company decided to suspend mining the West Denak pit and started processing stockpiled ore, which is planned to continue into 2013. Production guidance was lowered to about 2.9 - 3.4 million kg (6.5 - 7.5 million lbs) for 2012. The decision included trimming 20 full-time and 40 temporary jobs. Operating losses continued into the third quarter, with mill performance falling below forecast, and production being further complicated by processing the oxidized, stockpiled ores. Work continued throughout the fourth quarter to optimize plant operations, improve worker training programs and implement a more aggressive maintenance program. In spite of these setbacks, the company remains positive about the mid-to-long-term fundamentals of the market, being well-positioned to take advantage of a rally in molybdenum

TABLE 1.1. MINE PRODUCTION AND RESERVES, OMINECA REGION, 2012

Mine	Operator	Minfile (NTS ref)	Commodity	Deposit Type	Tonnes Mined (2011)	Tonnes Milled (2011)	Production	Proven and Probable Reserves (Effective Date)	Measured and Indicated Additional Resource (Effective Date)
Endako	Thompson Creek Metals Inc	093K 006 (093K.005)	Mo	porphyry	12 825 560 tonnes	8 947 309 tonnes	3 164 000 kg (6 977 000 lbs)	333.1 Mtonnes at 0.046% Mo (Dec 31, 2011)	63.2 Mtonnes at 0.030% Mo (Dec 31, 2011)
Mt Milligan (under construction)	Thompson Creek Metals Inc	093N 194 (093N.020)	Au, Cu	porphyry	N/A	N/A	N/A	531.8 Mtonnes at 0.31 g/t Au, 0.20% Cu (Dec 31, 2011)	247.2 Mtonnes at 0.17 g/t Au, 0.15% Cu (Dec 31, 2011)
Shasta	Sable Resources Ltd	094E 050 (094E.026)	Au, Ag	Low-sulfidation epithermal	20 000 tonnes	20 000 tonnes	<85.5 kg (<3000 oz AuEq)	5000 tonnes (Dec, 2012)	20 000 tonnes (Dec 2012)

*Before 1989, 1.6 Mt at 2.84 g/t Au and 132.2 g/t Ag (Thiersch et al, 1997).

*Thiersch, PC, Williams-Jones AE, Clark JR (1997) Epithermal mineralization and ore controls of the Shasta Au-Ag deposit, Toodoggone District, British Columbia, Canada. Mineralium Deposita 32:44-57



Figure 1.5. Endako Mine – A. Mining in West Denak pit to supply low-grade stockpile; B. New Semi-Autogenous Grinding (SAG) mill.

prices. The company expects to return to mining ore from the open pits during the second half of 2013.

Future mining plans include the development of a Super Pit by mining the saddle areas between the Endako, Denak East and Denak West pits; a step-back of the Endako pit; and the Northwest Extension zone pit. Permitting approval for the Super Pit expansion was received in early March. Proven and Probable reserves are 331 Mt at 0.046% Mo, containing 137.8 million kg (303.9 million lbs) of molybdenum. Measured and Indicated resources are 63.2 Mt at 0.030% Mo, containing 17.2 million kg (38.0 million lbs) of molybdenum. Mine life is forecasted to 2028.

The Endako deposit is centrally located within the Endako quartz monzonite phase of the François Lake Plutonic Suite, a Jurassic-Cretaceous component of the Endako Batholith which intruded the Stikine and Cache Creek terranes from the Late Triassic to Middle Eocene. The Late Jurassic orebody occurs as a series of en echelon, ribbon-textured quartz-molybdenite veins that change strike orientation from east-northeast to north across the deposit from southeast to northwest. The combined ore-grade zone is about 4.8 km by 0.75 km across the Endako, East Denak, West Denak, and Northwest Extension zones.

1.2.2 Gold-Silver

1.2.2.1 Toodoggone Region

Sable Resources Ltd continued seasonal operation at the **Shasta** underground mine, 31 km north of Kemess South, from late May to October with a modest operating budget (Figure 1.6). Production was between 10 000 - 20 000 tonnes of milled ore, enough to maintain the operation. Ore is processed 11 km from the mine site at the Baker Mill, which has an optimum feed rate of 180 - 200 t/d. Generally, one pour a week produces five doré bars. Original reserves have been estimated at 1.6 Mt averaging 2.84 g/t Au and 132.2 g/t Ag (Thiersch et al. 1997). The company estimates reserves of 5000 tonnes, with the inclusive resource at 25 000 tonnes, enough to support two more years of mining. An additional 130 000 tonnes of historical resource is held nearby at the **Baker** and **Mets** properties.

Mining operations are focused in the Creek and JM zones where Au-Ag mineralized quartz-carbonate breccia veins and stockwork zones follow the north and northwest trending Shasta and J1 faults. Due to extensive stoping in the Creek zone in 2011, increased dewatering was required to access the excavation level. In the meantime, mining continued in the JM zone with a short drift to the north along the J1 structure for 2000 tonnes, and slashing of back pillars and benching off the floor of the D-stope on the 1233 level. Upon dewatering, sub-level stoping was planned for another 5000 tonnes until reaching the top of the Creek zone; mining method will then switch to cut-and-fill in close proximity to the Shasta fault. On the 1290 level, development continued at the south end of the Creek Zone with drifting toward the Shasta fault where cross-structures appear to control mineralization. A change in fault orientation is anticipated to have produced a dilatant zone favourable for mineralization. Underground drilling and blasting operations involve a small crew of a two miners. Blasting occurs every shift when excavating drifts, and longhole blasting occurs every few days as required to refill extraction points. Future exploration and mine development will follow a 20° downplunge in mineralization to the north.

The Shasta property is underlain by upper Toodoggone Formation dacitic lapilli tuff and epiclastic rocks, and Takla Formation andesites. A dacitic dome is situated east of the J1 fault and JM stope. Gold-silver bearing minerals acanthite and electrum occur in calcite-rich stage-2 veins that cut across potassic alteration and quartz-rich veins of the preceding stage. Associated silicification has increased the competency of the rock, making it amenable to underground mining.

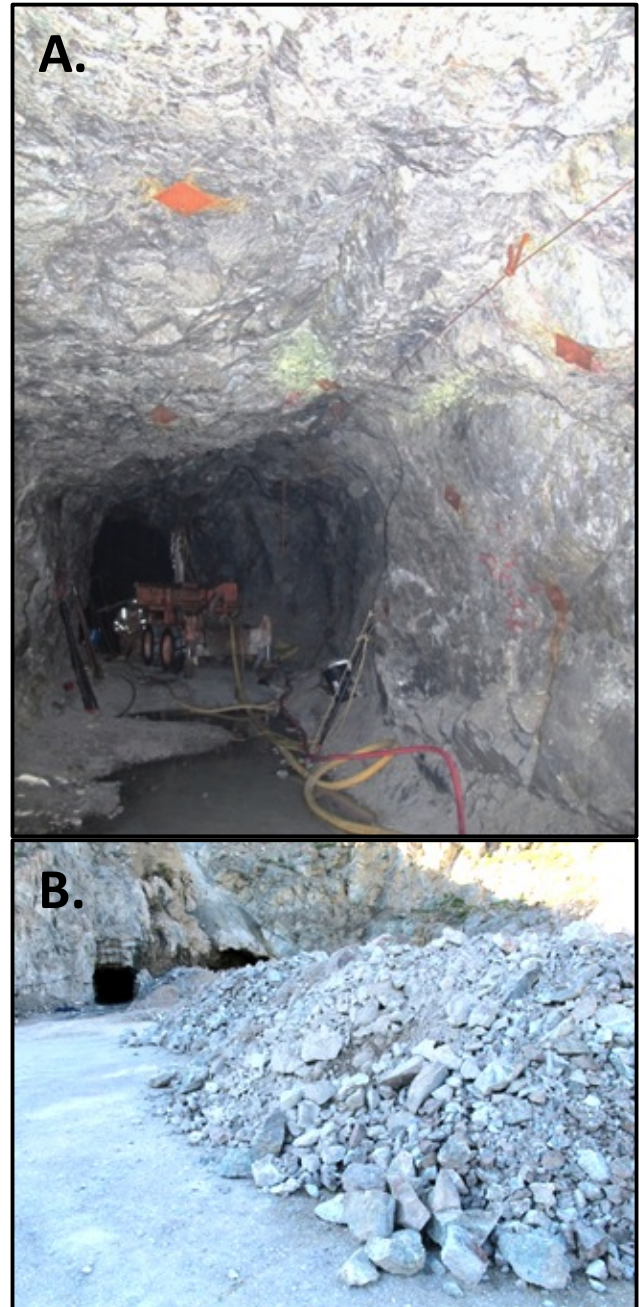


Figure 1.6. Shasta Mine – A. Drilling on the 1255m level; **B.** Creek zone open-pit and ore stockpile from JM zone.

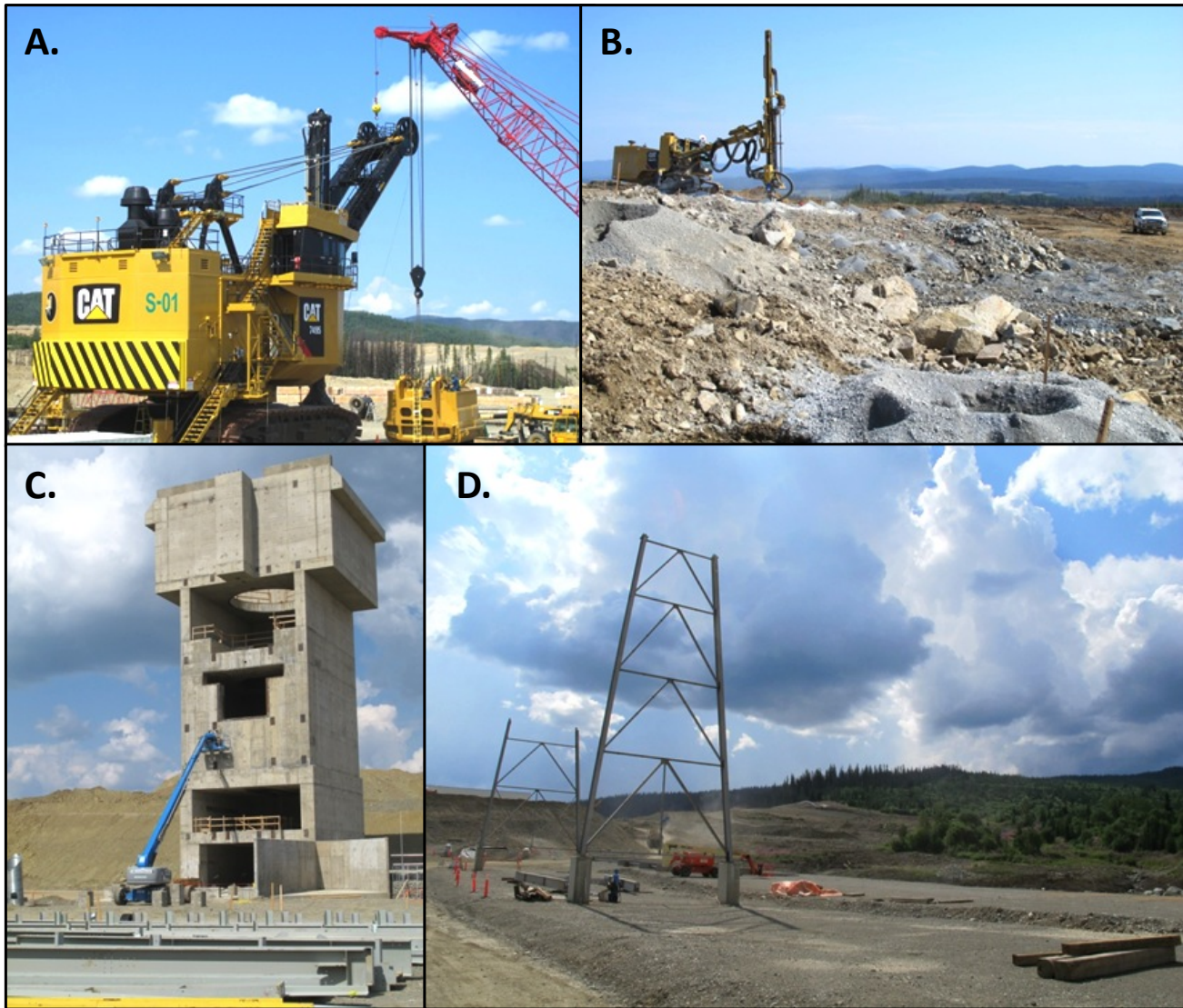


Figure 1.7. Mt. Milligan Mine Construction project – A. Assembling electric shovel in laydown yard; B. Blast-hole drilling on MBX stock; C. Crusher tower construction; D. Struts for conveyor to mill.

1.3 MINE DEVELOPMENT AND EVALUATION

1.3.1 Mine Development

1.3.1.1 Quesnel Terrane

Despite significant challenges from lower commodity prices, high turnover of skilled labour, and rising cost of supplies, Thompson Creek Metals Inc stayed on schedule with mine construction at the **Mt. Milligan** gold-copper project, 145 km northwest of Prince George (Figure 1.7). Mine construction began in mid 2010 at an estimated

capital cost of \$915 million. In the first quarter of 2012, the company warned of 10-20% cost inflation that would push the project as high as \$1.5 billion. In May, it was announced an additional \$430 million had to be raised through a debt offering (\$200 million) and a tangible equity unit offering (\$230 million). In August, the company posted an operating loss and slump in revenues for the second quarter and sought more financing for the project by selling an additional 12.25% stake in future gold production to partner Royal Gold Inc for \$200 million, plus US\$435 an ounce on gold delivery. The transaction prevented the company from defaulting on debt covenants and brought Royal Gold's stake in production to 52.25% and increased their investment to \$781.5 million. In November, the company announced a \$350 million Secured Senior Notes offering in part to fund Mt. Milligan capital expenditure, and the closing of

TABLE 1.2. MAJOR EXPLORATION PROJECTS, Omineca Region, 2012

Property	Operator	Minfile (NTS ref)	Commodity	Deposit Type	Work Program
3Ts	Independence Gold Corp	093F 055, 068 (093F.005)	Ag, Au	Low-sulfidation epithermal / vein	DD (3500m), G, GC (rock), P
Ahbau Creek & Lake	Williams Creek Gold Ltd	093G 007 (093G.019)	Au, Ag, Cu, Zn	Polymetallic vein and PGE	DSM, G, GC (rock, soil)
Akie	Canada Zinc Metals Corp	094F 031 (094F.036)	Zn, Pb, Ag	SEDEX	AB-EM (355 line-km), EN, GC (hyd)
Aley	Taseko Mines Ltd	094B 027 (094B.042)	Nb	Carbonatite- hosted	BU (600 kg), GD (2500 m), EN, FS, MS, TP (15 pits)
Aspen East & West	Redhill Resources Corp	093F 060 (093F.038)	Au, Ag, Zn, Pb, Cu, Mo	epithermal, vein	GC (rock, soil, silt, bio), IP (57.8 line-km)
Bandit	Copper Creek Gold Corp / Stina Resources Ltd	(093F.008, 009, 018, 019)	Cu, Ag, Au, Mo	porphyry	A, GC (soil), PD (1402 m)
Big Bear	Parlane Resource Corp	(093F.035,036,025, 026)	Au, Ag	Low-sulfidation epithermal	DD (1620), GC (soil, silt, rock), IP (14 line- km), MG
Blackwater Gold Project	New Gold Inc	093F 037 (093F.016, 026)	Au, Ag	Low-sulfidation epithermal	A, DD (196 606 m), CD/GD (40 000 m), EN, FS, G, GC (soil, till), TP
Blackwater East & West (Dave 2)	RJK Explorations Ltd	093F 037 (093F.016,)	Ag	Low-sulfidation epithermal	A, DD (2370 m), GC (soil), IP (18.5 line-km), MG, P
Blackwater East (Kuyakuz Mtn)	Driven Capital Corp	(093F.018, 028)	Au, Ag, Zn, Pb, Cu	Low-sulfidation epithermal, porphyry	A, IP (30 line-km), MG (30 line-km)
Capoose	New Gold Inc	093F 040 (093F.024, 025, 034, 035)	Ag, Au	Low-sulfidation epithermal	A, DD (10 894 m), TR
Captain	Orestone Mining Corp	093J 026 (093J.081, 093K.090)	Cu, Au	Alkalic Porphyry	DD (1500 m)
Cathedral	Thane Minerals Inc	094C 018, 048 (094C.003, 012, 013, 022, 023)	Cu, Au	Alkalic Porphyry	G, GC (rock, soil, silt)
Choo	Serengeti Resources Inc	093N 131 (093N.019)	Cu, Au	Porphyry	DD (1301 m)
Copley	Northern Vertex Mining Corp	093F 070 (093F.076)	Au	Low-sulfidation epithermal	A, DD (1200 m)
Decar	Cliffs Natural Resources Inc	093K 041 (093K.094)	Ni	Ultramafic	A, DD (15 205 m), EN, GD (1473 m), MS, PEA
Frog	International Samuel Exploration Corp	094L 014 (094L.005)	Cu, Au, Ag, Mo	Porphyry	*AB-MG (1029 line- km), GC (rock, silt), P
Galileo	Amarc Resources Ltd	(093C.083, 084, 093, 094, 095; 093F.004)	Au, Ag, Cu	Low-sulfidation epithermal, porphyry	AB-MG (600 line-km), G, GC (soil), IP (86 line-km)
Groundhog	Atrum Coal	104A 087 (104A.089)	Anthracite	Sedimentary	CQ, DD (4580), PEA
Hoof	Porpoise Bay Minerals Ltd	093G 018 (093G.071, 081)	Mg, Ni	Ultramafic	A, DD (1500 m)
Hubble	Amarc Resources Ltd	(93F.048)	Au, Ag, Cu	Low-sulfidation epithermal, porphyry	A, AB-EM/AB-MG (33 line-km), DD (700 m)
JD	Tower Resources Ltd	094E 171 (094E.045)	Au, Ag, Zn, Pb	Low-sulfidation epithermal	DD (3000 m), G, GC (soil)

continued on the following page

TABLE 1.2. (CONTINUED)

Property	Operator	Minfile (NTS ref)	Commodity	Deposit Type	Work Program
Kechika Regional (Pie & Mt. Alcock)	Canada Zinc Metals Corp	094F 023 (094F.045, 046, 063, 064)	Zn, Pb, Ag	SEDEX	AB-EM (1161 line-km), GC (hyd)
Kemess Underground	AuRico Gold Inc	094E 021 (094E.007)	Cu, Au	Porphyry	EN, FS, R
Key	Troymet Exploration Corp	093F 069 (093F.006)	Au, Ag, Zn, Pb, Cu, Mo	Low-sulfidation epithermal, porphyry	A, DD (867 m), G, GC (soil), IP (9.6 line-km), P
Klow	First Point Minerals Corp	093N 245 (093N.042, 043)	Ni	Ultramafic	DD (1579 m), MG
Km 26	Fort St James Nickel Corp	093K 113 (093K.087)	Ni	Ultramafic	*DD (813 m)
Kwanika	Serengeti Resources Inc	093N 073 (093N.054)	Cu, Au	Alkalic Porphyry	DD (1472 m), IP (3 line-km), PEA
Lustdust	Alpha Gold Corp	093N 009 (093N.053)	Cu, Au, Ag, Zn	Skarn	*AB-EM/*AB-MG, *G, *GC (rock, soil), *P
MAC	Stratton Resources Inc	093K 097 (093K.083)	Cu, Mo, Ni	Mo porphyry (Low F-type), Ni-alloy	GC (rock, soil - 22.4 line-km)
Manson Creek Group	Angel Jades Mines Ltd	(093N 068)	Au	Vein	G, GC (rock), TR
Mex	Gold Fields	094E 057 (094E.027)	Cu, Au	Alkalic Porphyry	DD (2200 m)
Mugaha	QMC Quantum Minerals Corp	(930.045, 046)	Au	Vein	TR (1064 m), G, P
OGK	Tajiri Resources Corp	093A 040 (093A.061)	Cu, Au	Alkalic Porphyry	AB-MG/AB-RD/AB-EM (505 line-km), GC (rock)
PG	Porpoise Bay Minerals Ltd	(093G.054, 055, 064, 065)	Au	Vein	A, AB-EM/AB-MG (76 line-km), TR
Quesnel Trough / QUEST	Xstrata Copper Canada Inc	(093G, J, K)	Cu, Au, Mo	Porphyry	A, G, GC (soil), IP (77 line-km), P
Ruby	Brocade Metals Corp	094C 022 (094C.025,015)	Ag, Au, Zn, Pb	Vein	DD (640 m)
Tacheeda Lake	International Montoro Resources Inc	093J 019 (093J.078)	Nb, REE, Ta	Carbonatite-hosted	AB-MG/AB-RD (989 line-km)
Tagai	Strategic Metals Ltd	093G 075 (093G.041)	Au, Cu	porphyry	RC (1000 m)
Tas	Rich Rock Resources	093K 110 (093K.099)	Cu, Au	Alkalic Porphyry	A, 3D-IP, MG
Tchentlo	Serengeti Resources Inc	093N 235 (093N.017)	Cu, Au	Porphyry	DD (1513 m)
Trout	Venerable Ventures Ltd	093F 044 (093F.067)	Au, Ag	Low-sulfidation epithermal	DD (2200 m), G, GC (rock, soil), IP (75 line-km), P
Zakco	Strategic Metals Ltd	093F 029 (093F.076)	Au, Ag, Cu	Low-sulfidation epithermal	RC (1000 m)

Work Program Abbreviations:

A = access (trail, road construction on claims); AB-EM = airborne electromagnetics; AB-MG = airborne magnetics; AB-RD = airborne radiometrics; BU (X tonnes) = bulk sample (weight in tonnes if known); CD = condemnation drilling; CQ = coal quality testing; DD (Xm) = diamond drilling (totalling X metres); DSM = digital surface model; EN = environmental baseline studies/monitoring, remediation work; FS = Feasibility studies; G = geology, mapping, etc.; GC = geochemical sampling (rock, silt, soil, till, biogeochemical, hydrogeochemical etc.); GD = geotechnical drilling; GP = geophysics (general); IP (X line-km) = induced polarization (totalling X line-kilometres); 3D-IP; MG = magnetics; MS = metallurgical studies; P = prospecting; PEA = Preliminary Economic Assessment, scoping study; PD = percussion drilling; PF = Prefeasibility studies; R = reclamation; RC = reverse circulation drilling; TR = trenching; TP = test pits; *indicates work from 2011 that was either late in the year or previously unreported

its revolving credit facility. In addition to financial re-arrangements, the company also applied to amend its Environmental Assessment (EA) Certificate to include provisions for a 450-person camp on site during the operational phase, and to lease the Kemess Mine load-out facility in Mackenzie instead of constructing a new facility in Fort St. James.

Over the nine months ending Sept 30, \$492.2 million was spent on mine development and construction of the processing plant. The company reports capital expenditure covered construction of the tailings storage facility (TSF), buildings, and facilities (concentrator, truck shop, administration building, primary and pebble crushers), plant site earthworks, cement works, steel erection, construction camp costs, mine development, mining equipment, and engineering design costs. Mining equipment was on ground in January 2012, and by August eight 797 haul trucks were on site. Drilling and blasting of the MBX stock started in July with small shots and test patterns, with mined material to be used for tailings construction. Since the inception of the project, \$935 million has been spent on a cash basis as of Sept 30, with an expected \$515 - \$585 million remaining to be spent before project completion in Q3 2013 and commercial production in Q4 2013.

The Mt. Milligan mine will be an open-pit operation with 60 000 t/d copper flotation concentrator. Average annual production over the current 22-year mine life is expected to be 37 million kg (81 million lbs) of copper and 5460 kg (194 000 oz) of gold. The first six years production will be higher averaging 40 million kg (89 million lbs) of copper and 7428 kg (262 000 oz) of gold. Life-of-mine strip ratio is 0.84:1. Once achieving design production capacity, the mine is expected to account for 50% of Thompson Creek revenue, and will diversify the company from being a pure-play molybdenum producer, adding copper and gold as a hedge against commodity price cycles. The combined Main and Southern Star deposits have a resource of 706.7 Mt (Measured and Indicated) at 0.33 g/t Au and 0.18% Cu, containing 212 621 kg (7.50 million oz) Au, and 1288 million kg (2.84 billion lbs) Cu. Reserves are 531.8 Mt (Proven and Probable) at 0.31 g/t Au and 0.20% Cu, containing 170 948 kg (6.03 million oz) Au, and 963 million kg (2.12 billion lbs) Cu. This represents the second largest gold reserve in Canada. The Mt. Milligan Mine will be the first greenfield metal mine in British Columbia since the Max Molybdenum mine in 2007, and the Huckleberry and Kemess South mines in 1997. There were approximately 900 people working at the site in 2012 including and contractors. The permanent operations workforce is expected to number about 350.

The Mt. Milligan property is underlain by Late Triassic Witch Lake succession basaltic-andesitic rocks of the Takla Group. Westerly-dipping monzonitic stocks, the MBX and Southern Star, are central to mineralization. Copper-gold mineralization in sulfide veinlets and disseminations is hosted in the stocks, their brecciated margins, and in the adjacent volcanics concentrated along conformable horizons and the monzodiorite Rainbow Dike. In the Main deposit, potassic alteration and Cu-Au mineralization gives way to Au-only mineralization and carbonate-rich phyllic-intermediate argillic alteration in the 66 zone, southeast of the Rainbow Fault.

1.3.2 Mine Evaluation

1.3.2.1 Toodoggone Region

AuRico Gold Inc awaited results of a Feasibility Study for a decision on the **Kemess Underground** project 5.5 km north of the past-producing Kemess South mine and 294 km northwest of Mackenzie. Completion of the study is expected for late 2012. In the meantime, environmental baseline studies and negotiations with First Nations continued, as did reclamation and closure work on Kemess South that included: finishing the spillway; rehabilitating borrow areas; re-sloping/vegetating areas around the dam; road reclamation; ditching; waste dump planting; and fisheries and water quality monitoring. In a 2011 PEA study, Northgate Minerals Corp updated the resource estimate to 136.5 Mt at 0.56 g/t Au, 0.29% Cu, 2.11 g/t Ag (Indicated); and 6 Mt at 0.42 g/t Au, 0.22% Cu, 1.65 g/t Ag (Inferred). The study outlined an 8 Mt/y underground block caving operation with a single extraction level. Average annual gold production is estimated at 2693 kg (95 000 oz), and copper at 18.8 million kg (41.4 million lbs). Total mineable tonnage is approximately 88 Mt. The mine, with a projected 12 year life, would utilize a permitted area for tailings, and existing infrastructure and mill facilities at Kemess South. Twin drifts would convey crushed ore from underground, provide access into the mine, and ventilation intake-return.

Porphyry-style copper - gold - molybdenum mineralization occurs as early and main-stage veins with potassic and phyllic alteration in the Kemess North quartz diorite-quartz monzonite (part of the regional Early Jurassic Black Lake Intrusive suite) that underlies the East Cirque area, and to a lesser degree in proximal Takla Group andesite/basalt flows and tuffs.

1.4 EXPLORATION HIGHLIGHTS

1.4.1 Porphyry Copper, Gold and Molybdenum Projects

1.4.1.1 Quesnel Terrane (Cu-Au porphyry)

Porphyry copper prospects in north-central BC are hosted in the Quesnel arc, a volcanic terrane that accreted to ancestral North America in the Early-Middle Jurassic, and the Stikine terrane, the east margin of which represents the Toodoggone district. The Omineca Region comprises the northern 300 km of this intermediate volcanic belt, which extends over 1000 km throughout much of central BC. The arc had a two-phase development. The Early Triassic Takla Group comprises of basal sedimentary rocks that grade upward through inter-fingering volcanic successions, including the Inzana Lake and Witch Lake successions. These are overlain by Early Jurassic, partially subaerial volcanic suites laid down on a more mature arc. Coeval intrusions, including the batholithic Hogem intrusive complex, are distributed throughout the area and generally shift from more alkaline compositions in the Early Mesozoic to more subalkaline in the Cretaceous. The northwest trending Pinchi and Manson Creek faults bound the northern Quesnel trough on the west and east sides respectively. Gold-copper ± molybdenum porphyry deposits of both alkalalic and high-potassic calc-alkaline affinity are known within the region.

Serengeti Resources Inc conducted a follow-up drill program at their **Kwanika** property, 150 km north of Fort St. James. Three holes tested an IP geophysical anomaly that extends up to 800 m north of the Central Zone, and where good Cu-Au grades have been intersected in wide-spaced drilling. Drilling over a 400 km strike length confirmed the system remains open to the north and at depth. One additional drill hole tested a strong IP and magnetic anomaly 15 km south of the Central Zone area. An IP survey east of the Central Zone was also completed. In early 2012, Serengeti reported the start of an independent PEA study on the higher grade Cu-Au resource at Kwanika. The study will investigate a 15 000 t/d, combined open-pit and underground operation. The resource estimate as of March 2011 is 243.6 Mt at 0.23% Cu and 0.21 g/t Au, containing 558 million kg (1.23 billion lbs) of copper and 47 000 kg (1.66 million oz) of gold in the Indicated category, and 295.1 Mt at 0.19% Cu and 0.10 g/t Au, containing 567 million kg (1.25 billion lbs) of copper and 26 000 kg (0.91 million oz) of gold in the Inferred category. The Kwanika Project consists of two porphyry deposits, the Central Zone (Cu-Au) and the South Zone (Cu-Mo-Au-Ag), separated by 2 km along a northwest trend paralleling the Pinchi Fault. Both are associated with

potassically altered alkalalic-to-intermediate intrusive rocks of the Hogem complex.

Serengeti also conducted a 12-hole drill program financed by Freeport-McMoRan of Canada Ltd at **Tchentlo** and **Choo**, 86 km northwest of Fort St James, to test seven targets (Figure 1.8). At **Tchentlo**, three drill holes exploring coincident IP/magnetic and Cu-Mo-Au-Pt soil anomalies encountered scattered anomalous gold, and several zones of structurally controlled Cu-Mo mineralization hosted in diorites and gabbro. At **Choo**, three holes exploring IP targets within the transition from Inzana Lake to Witch Lake volcanics (including the historic Camp target) encountered gold-anomalous intervals at or near contacts within intercalated hornblende andesite-latite porphyry, volcanoclastic rocks, and feldspar porphyry dikes. The project area follows a 60-km long east-west trending flexure of the Hogem intrusive complex that is evident in regional magnetics.

In January, Orestone Mining Corp announced the results of a drilling program at **Captain**, 46 km northeast of Fort St. James. The program targeted a large Cu-Au porphyry system over a 3.25 km strike length across an interpreted intrusive. Drilling intercepted over 400 m of fine disseminated sulfide, and zones of fracture controlled sulfide with altered volcanic rocks and monzonite. Follow up petrography on mineralized samples suggests a Fe-oxide/Fe-carbonate potassic-to-phyllitic assemblage similar to the Au-rich zone at Mt. Milligan. Previous geophysical results (chargeability-resistivity high on the eastern flank of a 5 km-scale magnetic high) and this drilling has further defined the 1 x 3 km East Target area. Two other similar targets have been determined by geophysical survey within a 50 km² potential system. Outcrop is rare and overburden is 20-40 m deep over the East Target area. In November, a 3-hole drill program on the East Target was underway, and site preparation for over 38 newly approved drill sites.

At the **OGK** property, 194 km north of Fort St James, Tajiri Resources Corp completed an airborne geophysical survey with follow-up geochemical sampling program in September. Sampling focused primarily on the Slide Mountain area where Cu-mineralized shear zones have historically been drill tested in the Duckling Creek syenite complex near the OGK claim boundary. Anomalous Cu-Au in outcrop was confirmed by the sampling. The OGK property lies 8 km northwest of the Lorraine deposit.

Rich Rock Resources completed a ground IP and magnetics survey of the **Tas** property, 50 km north of Fort St. James. In February, the company reported preliminary results of a 3D-IP survey that showed anomalous chargeability over a 750 x 250 m area in the Ridge zone which is also associated with elevated Cu-Au in soils over 2500 x 1000 m, and K and Th/K anomalies. Three other IP targets were developed including the 900 x 300 m Southeast target at the northeast margin of the Tas pluton that also has a 1100 x 300 m copper-in-soil anomaly. A large deep IP target partially overlaps both the Ridge



Figure 1.8. Tchentlo/Choo project – A.-C. Serengeti Resources team demobing, airlifting samples and supplies.

Zone and Southeast targets. The property is underlain by cherty tuff and argillite of the Inzana Lake Formation and the dioritic Tas pluton. A northeast trending porphyry dike swarm with associated breccias and shear zones cuts the Ridge zone.

Drilling programs were postponed in Xstrata Copper Canada Inc's **Quesnel Trough** regional project while an MOU with First Nations was being negotiated. In 2011, a multi-stage porphyritic monzonite was drilled at **Inza** with some elevated Cu-Au and near ore-grade Mo values (Figure 1.9). The property, 54 km northwest of Fort St. James, is optioned from Strongbow Exploration Inc. Elsewhere, an IP survey was conducted on **Pilot Mountain (Block 10)**, 18 km northwest of Prince George, where 2011 drilling intersected monzonite porphyry on North Pilot Mt; and 10 km to the north, drilling was planned to test a magnetic low anomaly at **Eye**, under option from Kiska Metals Corp. Grassroots and early stage work involving IP surveys and MMI soil sampling was completed on **Block 12** and **Lynx**, near Prince George and Fort St. James. Similar work was completed on the Serengeti Resources/Fjordland Exploration Inc **QUEST JV** properties **Rob, ST, PG, MP, and Ping** near Prince George. Drill testing an IP anomaly at **Ping** was also on hold.

In March, Williams Creek Gold Ltd acquired the **Ahbau Creek** (G-South) property, 26 km north of Quesnel, from New Gold Inc. The company commissioned a remote sensing satellite survey to produce a high-resolution digital surface model for revealing structural lineaments, and a soil survey was completed by mid October. Mineralization (Au-Ag-Cu ± Zn) in disseminated, fracture-controlled and massive sulfide has historically been reported along a northwest-trending shear zone for over a kilometre. The area is underlain by mafic-intermediate Takla Group rocks intruded by several rhyolite dikes, and the Cretaceous Naver intrusive suite. Nearby, the company staked and sampled **Ahbau Lake**, a gossanous target with historically reported elevated Platinum Group Element values on the lake's southwest shore close to the Spanish Thrust fault, a major crustal break.

Other properties underlain by the Hogem intrusive complex that had geochemical sampling and/or reconnaissance programs include Kiska Metal Corp's **Redton**, West Cirque Resources Ltd's **Heath**, and Thane Minerals Inc's **Cathedral**, located 100 km, 108 km and 210 km northwest of Fort St. James. Lorraine Copper Corp provided an initial resource estimate for the Main and Bishop zones at **Lorraine**, 170 km north of Fort St. James, with 6.4 Mt at 0.61% Cu and 0.23 g/t Au (Ind.), and 28.8 Mt at 0.45% Cu and 0.19 g/t Au (Inf.), at a 0.2% Cu cut-off. Newton Gold Corp compiled soil sampling data to develop 1.2 x 1.8 km nested Au-Cu anomaly at **Chuchi** (Chuchi Lake), 90 km north of Fort St. James, where Chuchi Lake Formation sedimentary rocks (Takla Group) are intruded by porphyritic monzonite stocks. West of the Pinchi Fault and Hogem complex, Alpha

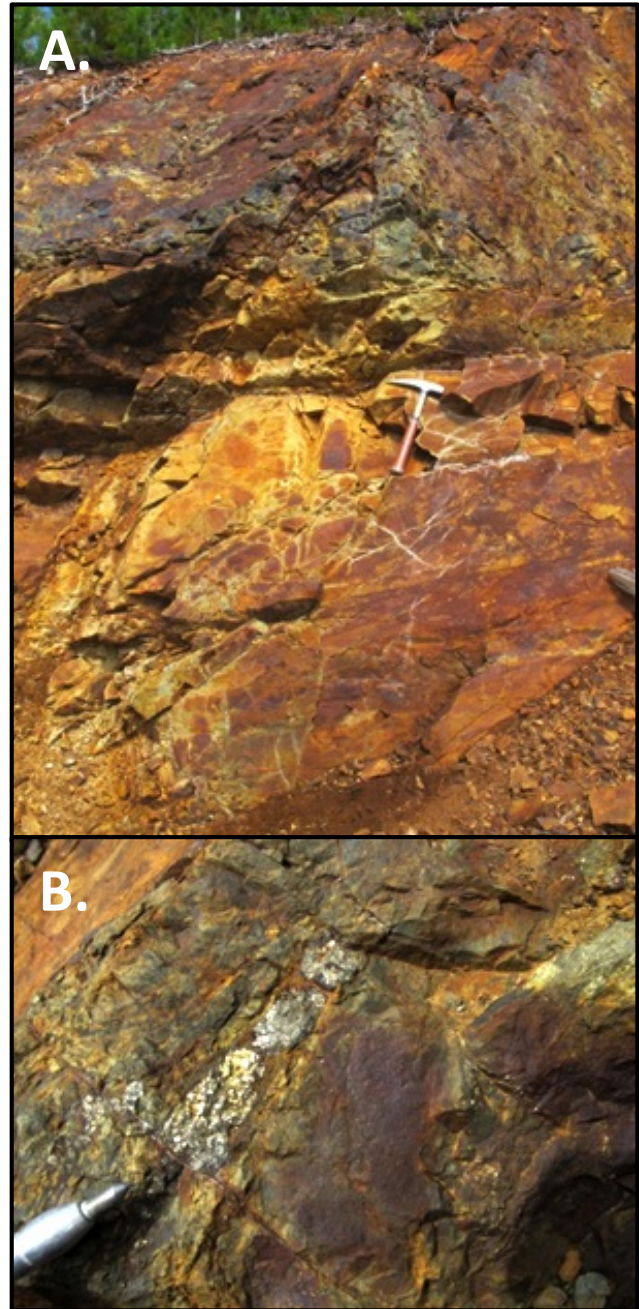


Figure 1.9. Inza project – A. 310°/-40° contact in North Inza with monzonite below and Inzana Fm. siltstone above, on southwest side of ridge; B. Pyrite-pyrrhotite veining in siltstone at North Inza.

Gold Corp compiled and analyzed data from the 2011 geophysics-geochemistry program at **Lustdust**, 144 km northwest of Fort St. James. Ten target zones outside the Canyon Creek garnet-diopside Cu-Au-Ag-Zn skarn deposit have been identified. The property is underlain by upper Paleozoic Cache Creek Group rocks intruded by the Eocene Glover monzonite stock. A resource estimate for the deposit was provided in 2010.

1.4.1.2 Toodoggone Region (Cu-Au porphyry)

Gold Fields ran a drill program at **Mex**, part of the Toodoggone project under option from Cascadero Copper Corp, to test a magnetic anomaly and explore deeper (to 332 m) into the known Mex system located 23 km north of Kemess South (Figure 1.10). Drilling encountered lithic-crystal tuff and latite dikes of the Lower Toodoggone Formation; and monzonite to monzodiorite intrusive with minor quartz-sulfide veinlets. Hole ME-12-008 showed early stage magnetite-biotite-quartz veins overprinted by pervasive phyllic alteration with gypsum, laumontite and late calcite veins. Copper mineralization may be transitional between the potassic alteration stage and phyllic overprint.

Grassroots exploration programs included International Samuel Exploration Corp's **Frog** project, 107 km north of Kemess South, where geochemical sampling and prospecting followed up a 2011 airborne magnetic survey and sampling program that identified copper and copper-molybdenum anomalies. Gold-silver enriched quartz veins with copper sulfide occur in quartz diorite/granodiorite of the Early Jurassic Pitman Batholith. Twenty-two km east of Kemess South, Orestone Mining Corp collected geochemical samples at **LaForce**, a 20 km northwest trending geochemical gold anomaly with a 1000 x 20 m silicified-sericitized zone of pyritic stockwork with minor chalcopyrite.

1.4.1.3 Nechako Plateau (Mo-Cu porphyry)

In April, Stratton Resources Inc provided an initial resource estimate for the **MAC** project, 80 km northwest of Fort St. James, with an Indicated 70.4 Mt at 0.063% Mo and 0.10% Cu (Figure 1.11). A near-surface high grade starter zone of 15.5 Mt at 0.104% Mo and 0.05% Cu is also categorized as Indicated. The Inferred resource is 177.9 Mt at 0.042% Mo and 0.05% Cu. In August, a soil survey covered the Peak zone, west of the Peak zone, and the west part of the Camp zone. The 700 x 500 m Camp zone is the most advanced of three targets. Quartz-molybdenite veins and veinlet stockwork are hosted in the potassically-altered margin of a porphyritic quartz-monzonite intrusive, and 50 - 90 m outward into biotite hornfelsed basaltic-andesitic host rocks. Within the Camp zone, the East Contact and Northwest Contact subzones represent two lobes of higher grade mineralization. The MAC property is underlain by Mississippian to Late Triassic volcanic/volcaniclastic rocks of the Cache Creek and Rubyrock Complexes, and Late Jurassic to Early Cretaceous François Lake Suite intrusives of the Endako Batholith.

Other molybdenum porphyry projects in the area saw limited work. TTM Resources Inc collected a 6 tonne bulk sample for metallurgical testing at **Chu**, 80 km southwest of Vanderhoof. The project is in the Pre-Application stage of the EA process where it is described

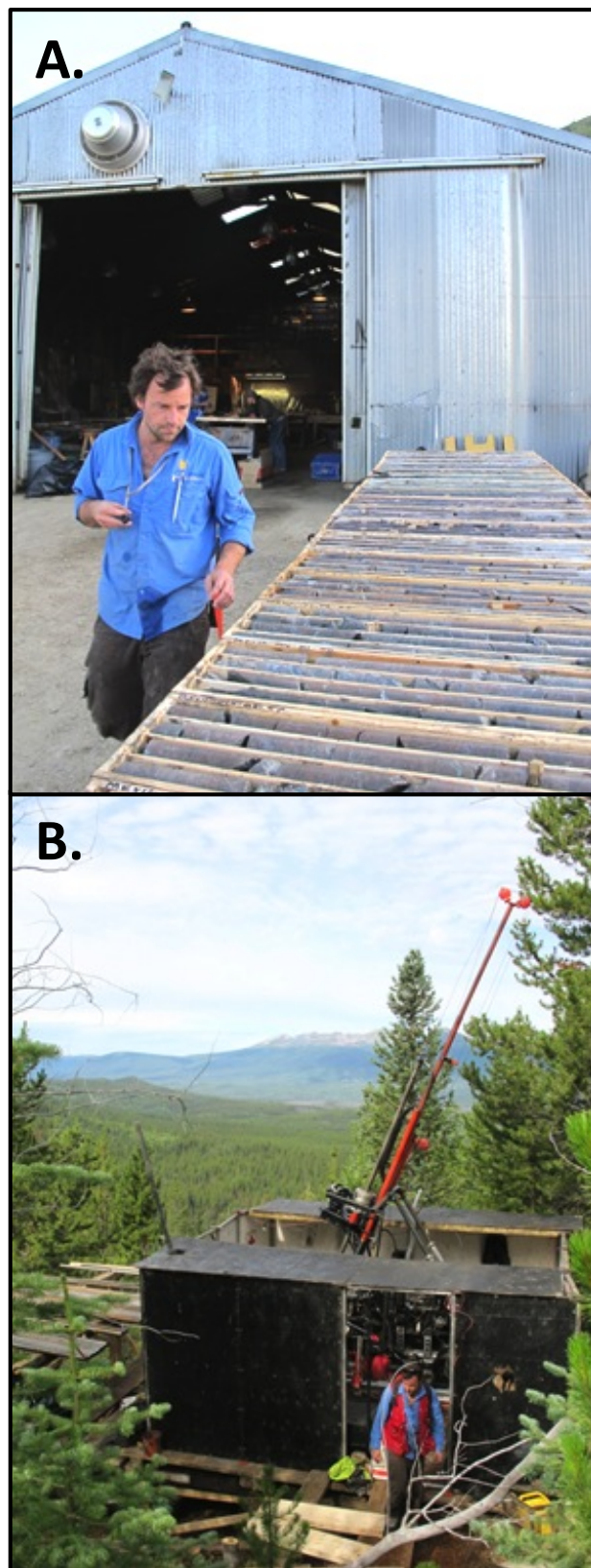


Figure 1.10. Mex project – A. Geologist Tim Stubly of Gold Fields assesses new drilling; **B.** Visiting drill on west side of Mex Ridge.

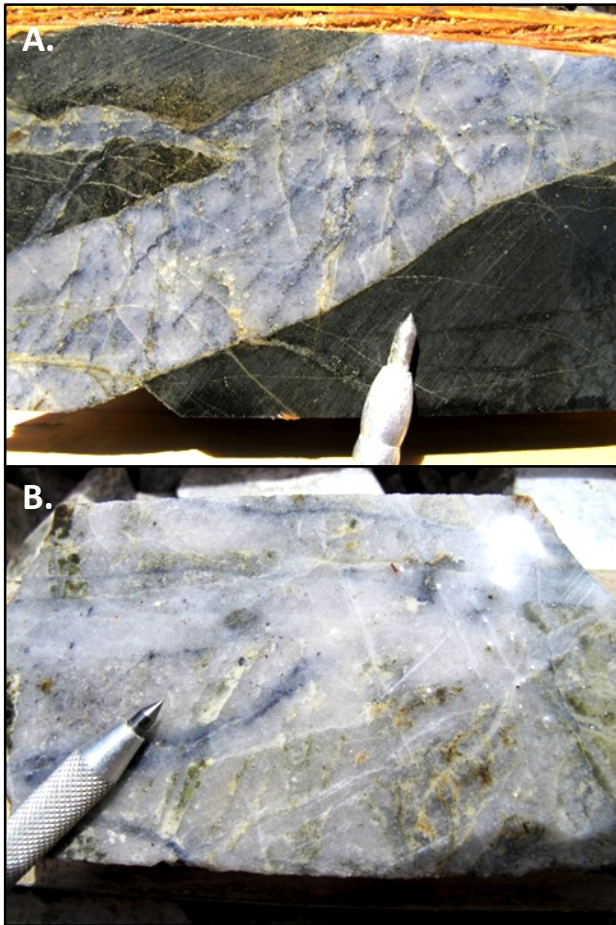


Figure 1.11. MAC project – A. quartz-molybdenite-pyrite-chalcocopyrite vein cutting hornfelsed volcanics, drill hole MC-1110 at 182 m; B. Dense quartz-molybdenite-chalcocopyrite stockwork in quartz monzonite, drill hole MC-1117 at 245 metres.

as a potential open-pit operation with production up to 90 000 t/d and an expected 20 year mine life. Quartz-molybdenite stockwork veinlets occur in the northeast margin of the CH pluton, in surrounding hornfelsed siltstone-argillite of the Jurassic Hazelton Group, and in feldspar-porphyry dikes that appear to be genetically related to the pluton. The mineralized zone is a 1700 x 400 m northeast dipping irregular tabular body with up to 700 m depth. At **Nithi Mountain**, 9 km south of Fraser Lake, Leeward Capital Corp conducted a brief exploration program in August to test the REE potential of a pegmatite on the east side of the property. The property is underlain by the granodioritic François Lake Plutonic Suite in which the Nithi quartz monzonite phase has been extensively faulted and brecciated in a 2 km wide northeast trending zone that hosts five vein-mineralized subzones. Coincident anomalous geochemical-geophysical circular features suggest small buried intrusions that appear to be related to mineralization. Both projects have Indicated/Inferred resource estimates from 2010 and 2011 respectively.

1.4.2 Epithermal Gold-Silver and Vein-type Projects

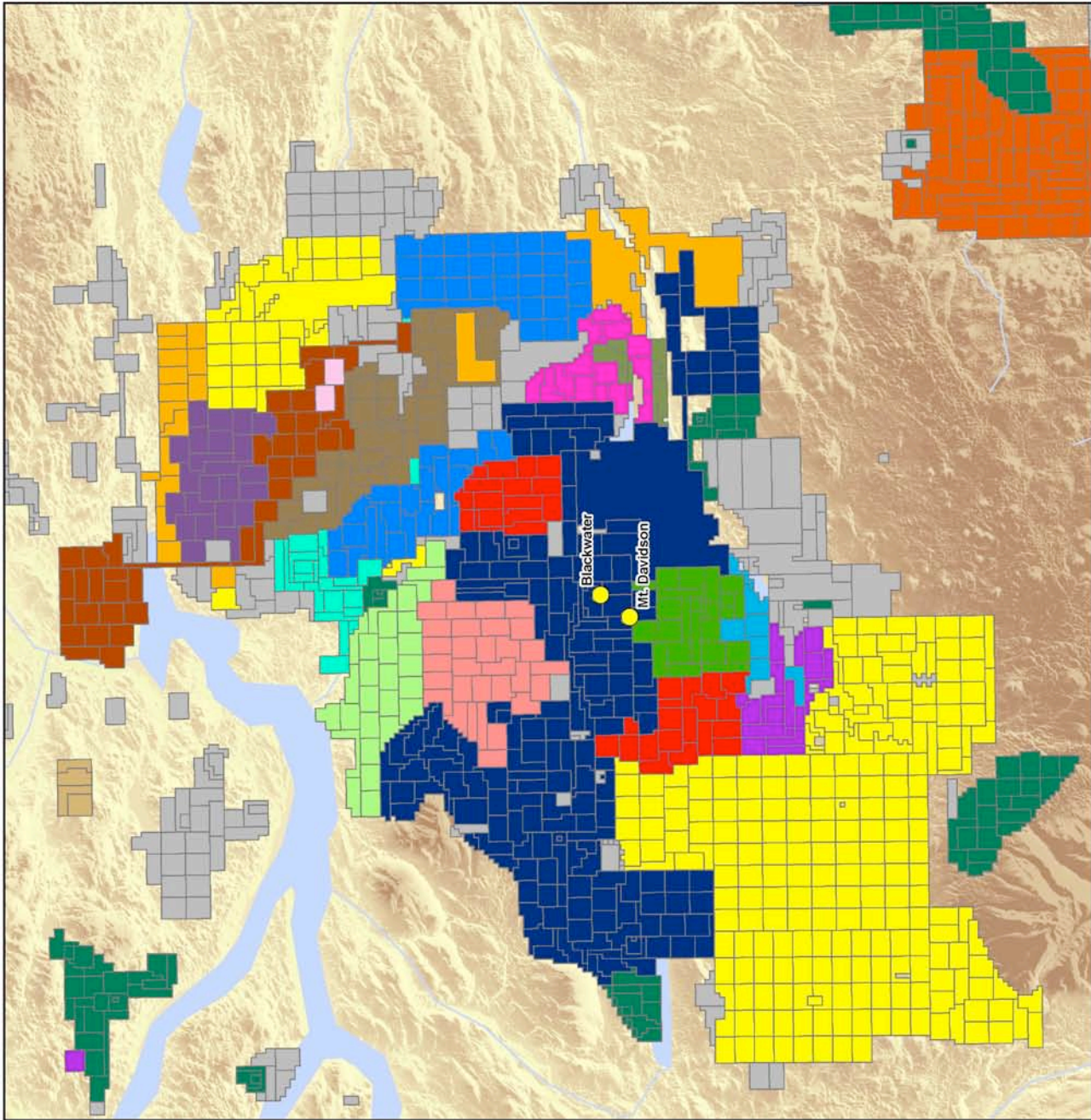
1.4.2.1 Nechako Plateau

The Nechako Plateau, part of the Interior Plateau physiographic province, is an area of moderate relief bound to the north by the Skeena Arch, to the west by the Coast Mountains, and to the east by the Cache Creek terrane. The area is underlain by Early-Middle Jurassic Hazelton Group island-arc volcanic rocks of the Stikine Terrane. Bowser Lake Group sedimentary and volcanic rocks were deposited from Late Jurassic to Early Cretaceous with the uplift of the Skeena Arch and development of the Bowser Basin to the north. Continental arc volcanism and intrusion of granodioritic plutons, including the Capoose Batholith, occurred during a Late Cretaceous orogenic event. Episodic volcanism continued into the mid-Eocene with eruption of the intermediate Kasalka (Late Cretaceous), felsic Ootsa Lake, and intermediate Endako Groups. Eocene volcanism appears to be closely linked with regional crustal trans-tension and basin-and-range style block faulting. The Chilcotin Group represents Miocene and younger volcanism forming lava fields of transitional basalts. Glacial till, colluvial, and fluvial deposits cover the area with bedrock exposures generally restricted to higher elevations.

In December 2011, New Gold Inc acquired Silver Quest Resources Ltd and their interest in the Davidson property, thus consolidating a 100% ownership in **Blackwater-Davidson**, now the **Blackwater Gold Project** (Blackwater), 110 km south of Vanderhoof in the Fawnie Range on the north slope of Mt. Davidson. The acquisition included the **Capoose** property, 25 km northwest of Blackwater. In March, the company acquired the **Auro** and **Auro South** properties directly southeast of Blackwater from Gold Reach Resources Ltd. The two acquisitions increased New Gold's land position, which is now over 1000 square km, giving the company more flexibility in locating infrastructure, as well as increased exploration potential (Figure 1.12).

The budget for New Gold's **Blackwater** drilling project, which included over 800 holes and 247 500 metres, was \$86 million (Figure 1.13). Additional expenditure for camp construction, infrastructure development, equipment and other capital purchases brought the total exploration budget to about \$129 million. By June, Blackwater had become the largest exploration project in BC with 18 drills on site (13 infill, 2 exploration, and 3 condemnation drilling). Drilling included 160 000 m of resource delineation in the main grid designed to: 1) define the ultimate limits of the resource; 2) infill and upgrade the resource to Measured and Indicated categories for a Feasibility Study; 3) drill for a potential high-grade feeder at depth; and 4) explore

Nechako Plateau



- AMARC RESOURCES LTD.
- ANSELL CAPITAL CORP
- BOT, JOHN CHRISOSTOM
- COPPER CREEK GOLD CORP
- DRIVEN CAPITAL CORP
- GLAZIER, RICHARD JAMES
- GREENCASTLE
- INDEPENDENCE GOLD CORP.
- KINROSS GOLD CORPORATION
- KOOTENAY RESOURCES INC.
- MOUNTAIN BOY MINERALS LTD.
- NECHAKO MINERALS CORP.
- NEW GOLD INC.
- PACIFIC CASCADE MINERALS INC.
- PARLANE RESOURCE CORP.
- RJK EXPLORATION LTD.
- SAULNIER, PAUL ALBERT
- TOWER RESOURCES LTD.
- TROYMET EXPLORATION CORP.
- TTM RESOURCES INC.
- Other

N

Projection: BC Albers
 Datum: NAD83
 Date: July 2012

0 10 20 km

Figure 1.12. Distribution of mineral titles in the Nechako Plateau area surrounding the Blackwater project of New Gold Inc., current to July 2012 (source: Mineral Titles, Ministry of Energy and Mines). Location of Mt. Davidson is also shown.

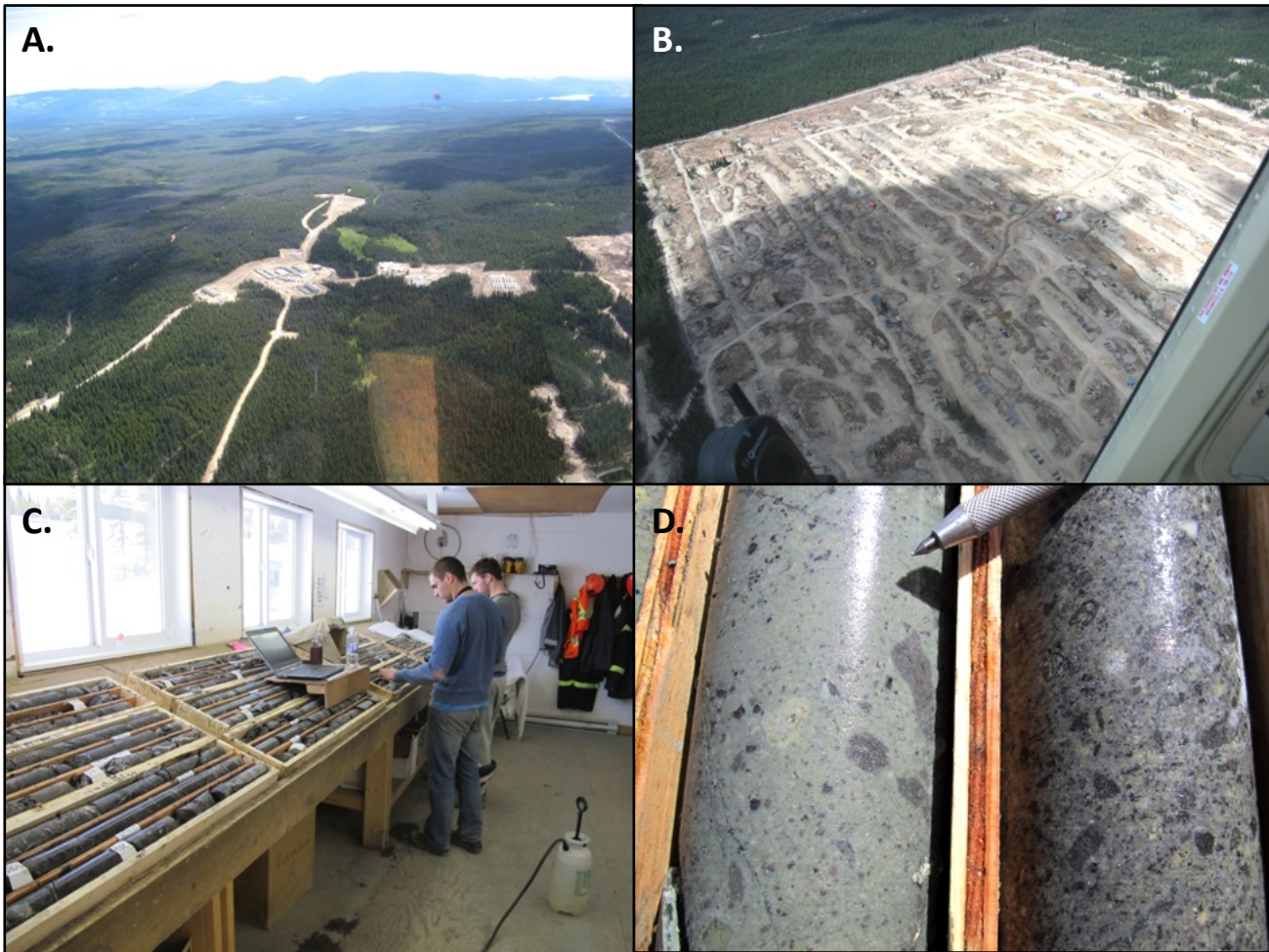


Figure 1.13. Blackwater project – A. Blackwater project from above; B. Blackwater drill grid from above; C. New Gold geologists logging faulted andesite in hole BW-410; D. Bleached versus less altered lapilli tuff with garnet replacement of fragment (A. and B. photos by Lori Borth, North Area Resource Manager).

potential extensions to the deposit. A roughly 1.1 km² drill grid was established comprised of vertical holes averaging 450 m, and later angled holes to tie the grid together. An additional 40 000 m drilling was allocated to condemnation for proposed facilities sites; and exploration drilling at **Capoose** surpassed 10 000 m (see below). Drilling confirmed strong continuity of mineralization across the central and southeastern parts of the deposit, and extension to the north beyond the delineation grid, and northwest to a zone of higher grade silver along the outer portion of the grid. By July, a regional exploration program of reconnaissance mapping and geochemical sampling (glacial till and soil) was underway, and identified four new targets.

In September, New Gold announced completion of a PEA based on drilling up to mid-May, for a 60 000 t/d open-pit operation with annual production of 14 373 kg (507 000 oz) of gold and 57 805 kg (2 039 000 oz) of silver for an initial 15 years. Average gold production in the first five years would be higher at 16 896 kg (569 000 oz). The resource estimate is 267.1 Mt at 0.88 g/t Au and 4.3 g/t Ag, containing 213 190 kg (7.52 million oz) Au and 1.05 million kg (36.9 million oz) Ag

in the Indicated category; and an Inferred resource of 120.5 Mt at 0.69 g/t Au and 7.3 g/t Ag, containing 75 410 kg (2.66 million oz) Au and 802 290 kg (28.3 million oz) Ag at a 0.30 g/t AuEq cut-off. The life-of-mine stripping ratio would be 2.36:1. The processing plant would utilize conventional crushing, grinding, leaching and carbon-in-pulp to produce a gold-silver doré product. A Feasibility Study is scheduled for completion in 2013. The company envisions construction by early 2015, and ore extraction by 2017. A Project Description was submitted to the EA office on Oct 24, initiating the Pre-Application phase of the EA process. The economic benefit to the economies of Vanderhoof and Prince George is an estimated \$75 million during construction and \$25 million per year during mining. New Gold has about 85 employees at the site, plus another 160 contractors. The 150 person camp was expanded in 2012 to accommodate 230 people, and a local office and sample preparation lab was opened in Vanderhoof.

Paraphrasing a 2012 PDAC conference abstract by New Gold geologist Mark Peterson, the deposit is a low to intermediate sulfidation epithermal system, the intrusive source of which remains undiscovered.

Mineralization is hosted by late Cretaceous Kasalka Group rocks in a complex assemblage of andesite flows, lapilli tuffs, and volcanic breccias; flow-banded and tuffaceous rhyolites; a heterolithic breccia containing altered fragments of other units; and intensely silicified hydrothermal breccias. Alteration and mineralization are characterized by pervasive silica-sericite-illite accompanied by disseminated and stockwork veined pyrite-pyrrhotite ± marcasite ± sphalerite ± galena ± chalcopyrite ± arsenopyrite ± bismuthinite. Gold occurs as 25-50 µm grains associated with sulfide and silicification. Multiple episodes of hydrofracturing and silicification are apparent. Local Mn-rich spessartine garnet replacement zones within the silicified volcanics are common in the western portion of the deposit. The currently delineated trend of mineralization strikes WNW-ESE and dips moderately north over an area measuring at least 1500 x 500 m, and to depths of more than 450 m. Elevated grades appear to be localized along the margins of silicified breccia bodies and at fault (broken rock zone) intersections. A minimum age of 67 Ma was determined from a felsic dike sampled from historic drill hole 92-35 (Friedman et al. 2001), and two K-Ar ages of 70.2 - 68.1 Ma on related rocks. The Blackwater wedge occupies a roughly 5 km square area and is juxtaposed against Ootsa Lake Group rocks across steeply-dipping normal faults on the west and north, implying the Blackwater block is a high-standing remnant or horst in the region, preserving what may be a Late Cretaceous rhyolite dome complex.

By September, 22 holes had been drilled at New Gold Inc's **Capoose** property. Early assay results showed Au-Ag mineralization both within and beyond previously defined boundaries for the resource. The property is underlain by Hazelton Group andesite flows, andesitic-dacitic tuffs, and argillite-siltstone intruded by quartz monzonite of the Capoose Batholith. Strongly silicified-sericitized, garnet-bearing fragmental rhyolite sills are the prime host of mineralization, and cut across hornfels at the upper contact of the batholith. The deposit covers an 850 x 1000 m area, is elongated north-south parallel to stratigraphy, and appears to dip moderately to steeply to the west. Mineralization occurs as pyrite-sphalerite-galena-chalcopyrite-arsenopyrite disseminations, aggregates and veinlets. Silver Quest Resources Ltd provided a resource estimate in 2010.

In January, Independence Gold Corp provided an updated resource estimate for the **3Ts** project, 18 km southwest of Mt. Davidson. The new estimate used an expanded database of 176 drill holes (32 773 m) incorporating 3278 assays from 2011. The cut-off grade was lowered from previous estimates to 1.0 g/t Au. The total Inferred estimate for the Tommy, Ted, and Mint veins combined is 3.61 Mt at 3.39 g/t Au and 85.15 g/t Ag, containing 11 181 kg (394 383 oz) Au and 280 380 kg (9.89 million oz) Ag. A mapping, prospecting and float sampling program during the summer was followed by drilling to test the Ted and Mint veins down-dip and

along strike beneath a cross-cutting microdiorite sill, as well as a Mint Vein northern extension. The **3Ts** project covers an epithermal quartz-carbonate vein system with more than a dozen mineralized veins, ranging up to 650 m in length and 20 m true width. Additional vein discovery potential is indicated by mineralized float boulders in the Ringer area and other parts of the property. Independence Gold was formed as a spin-off from the New Gold Inc acquisition of Silver Quest Resources Ltd in late 2011.

In June, RJK Explorations Ltd completed their phase one drilling program at **Blackwater East** and **Northeast**, 14 km northeast of Mt. Davidson. Drilling tested five widely-spaced initial targets derived from the 2011 exploration program. Poor drilling conditions were encountered but two drill holes intersected pyritic intervals with 2710 g/t Ag over 3.3 m and 38.9 g/t Ag over 6.62 m. Follow-up structural interpretation, detailed ground magnetics, IP surveying and MMI soil sampling was completed in the area. Results suggest mineralization is at the brecciated fault contact between felsic volcanics and sediments to the northeast, and that a prominent northwest trending feature may represent an extension of the fault contact. The company also resumed grassroots work at **Blackwater West** and **Dave 2**, located 15 km southwest of Mt. Davidson, and identified four initial drill targets.

On the **Trout** property, 60 km southwest of Vanderhoof, Venerable Ventures Ltd completed an IP survey, sampled previously uncut drill core, and collected rock chip samples from eight backhoe trenches around and along strike of the Discovery Zone Au-Ag showing. A drilling program in September followed up on three of seven priority targets that were generated through airborne magnetic, IP geophysical surveys, and ultra-trace geochemistry designed to see through 20 - 40 m of basalt cover. The company believes the Discovery and Camp zone showings occur within a northwest trending, fault-bound graben structure. The remaining four targets saw additional grassroots work.

Parlane Resource Corp completed an IP and magnetic survey, and additional geochemical sampling over nine gold-in-soil anomalous target areas at **Big Bear**, 19 km northwest of Mt. Davidson. Four of the nine zones (Chedakuz, Chedakuz South, Top Lake South, and Top Lake North) show moderate to high chargeability, with moderate resistivity. The property has limited outcrop, but is reportedly centered on a 2.5 km diameter aeromagnetic high anomaly situated between the mineralized Blackwater and Capoose systems. A drilling program commenced in November to test five target areas.

In late 2011, Northern Vertex Mining Corp in joint venture with Kootenay Silver Inc initiated a Phase-2 drilling program at **Copley**, 60 km southwest of Vanderhoof, to test the Smoking Pipe target. Ten of 12 holes intersected a 150 x 100 m near-surface mineralized zone that dips to the west, and remains open in three directions. Step-out drilling encountered hydrothermal

breccias. Previous exploration on the property has suggested a large 7 x 2 km low-sulfidation epithermal system. Silicified and argillized rhyolite, in three aligned topographic domes, hosts near-surface Au mineralization with disseminated and vein pyrite and anomalous zinc and mercury.

Amarc Resources Ltd (affiliated with Hunter Dickenson Inc) conducted an IP survey at its **Galileo** project, a 990 km² land package extending from 16 to 50 km southwest of Mt. Davidson in what the company refers to as the emergent **Blackwater-Newton gold belt**. The program focused on new mineral claims added to the southeast side of the main block, south and east of Independence Gold Corp's 3Ts project, and followed up an airborne magnetic survey that identified two deposit-scale potential intrusive targets. Soil geochemistry done in the area had no significantly anomalous results. Within the main tenured block, a mapping and sampling program covered five target areas defined by ground geophysical surveys in 2011 that could represent either epithermal Au-Ag or porphyry Cu-Au systems. Exploration at **Hubble**, 66 km southwest of Vanderhoof, consisted of mapping, geochemical sampling, an airborne geophysical survey flown over newly added mineral claims, and 3 drill holes to test a 3 km² chargeability anomaly derived from a 2011 IP survey. Pyrite-bearing sandstone and mudstone with graphitic intervals were encountered.

Strategic Metals Ltd ran drill programs on **Tagai** and **Zakco** located 34 km south of Fraser Lake and 56 km south of Vanderhoof, respectively. Reverse circulation drilling on both properties tested geochemical and geophysical anomalies associated with porphyry Cu-Au (Tagai) and epithermal Au-Ag (Zakco) targets.

Troymet Exploration Corp's program at **Key**, 8 km southwest of Mt. Davidson, included prospecting and sampling early in the year followed by an IP survey and RC drilling in October. The IP survey covered six target zones in the East Central area with the Buzz, SGN and Blue zones selected as priority for drill testing as coincident gold-in-soil anomalies, and the P1A target in the West Central area. Ten holes were drilled at Buzz, and 2 holes were drilled in each of the remaining three targets. Active logging prevented access to other target zones near the East Fault. A May 2012 technical report describes potential for Mo-Cu porphyry (East Central and West Central zones), epithermal Au-Ag (proximity to Blackwater and 3Ts), and VMS (Ram claims on Tsacha Mountain) deposit types.

In June, Copper Creek Gold Corp entered into an option agreement with Stina Resources Ltd on its **Bandit** property, 30 km east of Mt. Davidson. In September, a percussion drilling program in 15 widely-spaced holes followed up MMI soil-sampling that delineated a 2 x 5 km Cu-Ag-Au ± Mo anomaly coincident with a magnetic low. Anomalous, but sub-economic Cu-Au-Ag was intercepted, and 8 of 15 holes ended in basalt cover that is over 100 m thick in areas.

In August, Redhill Resources Corp entered into option agreements with Decade Resources Ltd and Mountain Boy Minerals for **North Blackwater** and **East Blackwater**, and with private individuals for the **Chutanli** and **Aspen** properties. The company now designates the combined properties as **Aspen East** and **Aspen West**, located on either side of TTM Resources' Chu property 78 km southwest of Vanderhoof. A reconnaissance geochemical program identified three new targets. A ground IP survey is planned for late in the year to cover four target areas (3 in Aspen east, and one in Aspen west), including the historic CH (April) polymetallic sulfide vein.

Driven Capital Corp completed an IP and magnetic survey on the southeastern portion of **Blackwater East (Kuyakuz Mtn)**, 25 km east of Mt. Davidson. The company found several IP anomalies trending north and northwest adjacent to a major regional lineament. The north trending anomaly has been traced over 1800 m near the western boundary of a locally silicified and phyllic-altered felsic volcanic sequence that is underlain by a deep 2 km wide magnetic feature. Previously completed soil sampling showed anomalous zinc-lead-silver-gold, and copper in the area.

1.4.2.2 Cache Creek Terrane

A private company, 0902744 B.C. Ltd., carried out prospecting and an airborne geophysical survey at **Green Gold**, 34 km west of Prince George. The discovery trench excavated in late 2011 exposed a clay zone containing quartz fragments and disaggregated stockwork. Nearby to the south, Porpoise Bay Minerals Ltd flew an EM and magnetic survey over the **PG** project, and excavated five shallow trenches over gold-in-soil and till anomalies. Overburden was too deep to reach bedrock. Both the Green Gold and PG properties are till-covered gold prospects near the Pinchi fault at the Cache Creek-Quesnel terrane boundary. Outcrops of quartz-carbonate-sericite altered rocks and listwanite have been observed.

1.4.2.3 Toadogone Region

On its **JD** project, 54 km northwest of Kemess South, Tower Resources Ltd drilled 18 holes in and around the Finn Zone intercepting near-surface Au-Ag mineralized intervals up to 31.5 m in width and 0.40 - 32.95 g/t AuEq (Figure 1.14). The goal of the drill program was to confirm historic drilling with a 10-hole fence in a sequence of five drill pads spaced 30 m apart, with two scissored drill holes per pad; and to extend the potentially continuous tabular mineralized body westward over the ridge to historic trenching. A single exploration hole tested the eastern extent and footwall of the Finn zone, and two holes on the west side of the ridge were positioned in gold-in-soil anomalies near historic trenches and the

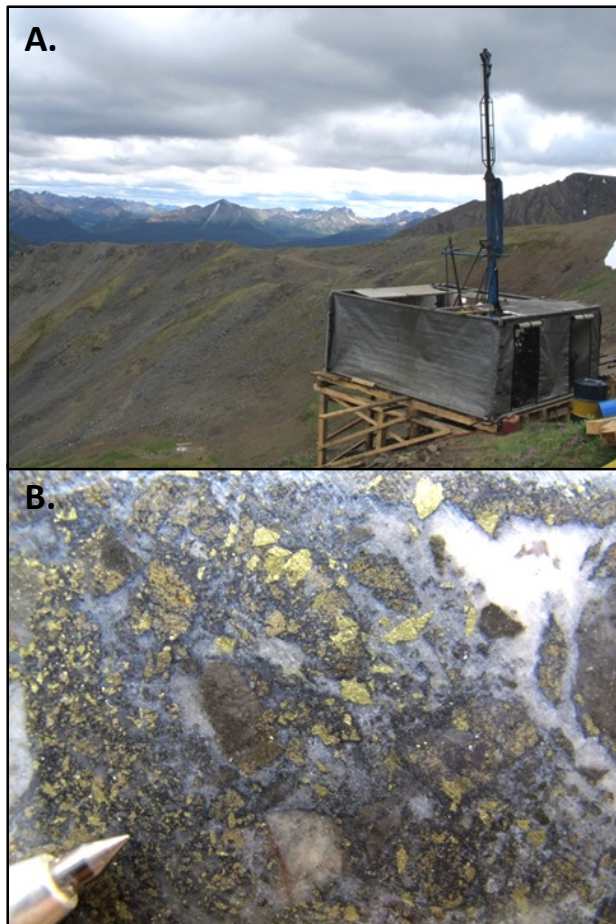


Figure 1.14. JD project – A. Drilling in the Finn zone, hole JD-12-10; **B.** Calcite-quartz cemented breccia with chalcopyrite-pyrite-galena-sphalerite, hole JD-12-005, 46.9 m.

projected trace of the controlling structure. Mineralized intervals resulted in both areas. The Finn zone sits in an east-facing cirque above a flat-lying controlling feature that could be a reverse fault or unconformity. In addition to drilling, B-horizon soil samples were taken over a 1.0 by 1.8 km area in the Finn and Creek zones, four times the size of historic soil grids on the property.

The northeast striking and gently dipping Finn Zone is hosted in an apparent polymict volcanic breccia unit. The hanging wall and footwall to the zone consist of massive and locally porphyritic andesite, latite, and crystal tuff of the Lower Jurassic Toodoggone Formation (Metsantan Member). Spahlerite-galena-pyrite ± chalcopyrite mineralization is hosted in quartz-calcite veins and cemented breccias with silicification and phyllosilicate alteration.

1.4.2.4 Ancestral North America

At the **Mugaha** project, 15 km northeast of Mackenzie on Mount Morfee, QMC Quantum Minerals Corp conducted a shallow trenching program to

investigate 25 previously defined gold-in-soil anomalies. Fifteen trenches were dug by a heli-portable mini-backhoe, sampled and mapped. The property hosts mineralized quartz veins and veinlets in weakly metamorphosed and sheared Upper Proterozoic Misinchinka Group slate and siltstone.

Brocade Metals Corp conducted a short drill program at **Ruby**, 158 km northwest of Mackenzie, to determine if the Main showing continues at depth. The property is underlain by impure quartzite and quartz-mica schist of the Upper Proterozoic Swannell Formation (Ingenika Group) cut by Early Tertiary stocks and dikes (granophyre and quartz-feldspar porphyry). The Main showing occurs in a structurally complex area of folding, shearing and faulting, with multiple crosscutting sets of quartz-rich veins. A north-northeast trending polymetallic vein set contains pyrrargyrite (Ag_3SbS_3), tetrahedrite, and native silver. Vein breccias, quartz stockwork, and silicification are closely associated.

Angel Jade Mines Ltd continued trenching, sampling and mapping across five properties in the **Manson Creek Group**, 75-100 km west and northwest of Mackenzie, in a well-established placer gold area that follows the Manson Fault zone. Approximately 200 small pits exposing bedrock have been excavated.

1.4.3 Volcanogenic Massive Sulfide (VMS) and Sedimentary Exhalative (SEDEX) projects

1.4.3.1 Cache Creek Terrane

Using a technological database developed by Amarc Resources Ltd from 2007 - 2009, Rokmaster Resources Corp identified five coincident geochemical-geophysical targets for Kutcho-style VMS mineralization at **Bodine North**, 207 km northwest of Fort St. James. The property is underlain by Permo-Triassic bimodal volcanic and sedimentary rocks of the Sitlika assemblage that are considered to be the faulted southern extension of the Kutcho Creek Formation, which hosts the Kutcho Creek Cu-Zn VMS deposit 275 km to the north. The north-northwest trending, tight-to-moderately folded and faulted Sitlika rocks are situated between the Stikine and Cache Creek terranes.

1.4.3.2 Ancestral North America

In May, Canada Zinc Metals Corp (CZM) provided an updated resource estimate for the Cardiac Creek deposit, a zone of baritic zinc-lead-silver SEDEX mineralization within its **Akie** property, 250 km north-northwest of Mackenzie in the Kechika Trough (Figure

1.15). The report incorporated drilling from mid-2008 to end-2011 at a 5% zinc cut-off resulting in a resource of

- 12.7 Mt at 8.4% Zn, 1.7% Pb and 13.7 g/t Ag (Indicated);
- 16.3 Mt at 7.4% Zn, 1.3% Pb and 11.6 g/t Ag (Inferred);
- containing an Indicated 1.1 billion kg (2.4 billion lbs) of zinc, 214 million kg (472 million lbs) of lead and 158 760 kg (5.6 million oz) of silver;
- and an Inferred 1.2 billion kg (2.6 billion lbs) of zinc, 219 million kg (482 million lbs) of lead and 172 930 kg (6.1 million oz) of silver.

This represents a 23% tonnage increase from the 2008 estimate, and a 44% upgrade into the Indicated category. The deposit is open in all directions, with the potentially economic portion extending over 1300 m of strike length, at least 800 m below surface, and averaging 20 m in thickness. The company intends to complete the construction of a portal site and waste rock dump in preparation of underground exploration. Environmental baseline studies are ongoing.

Earlier in the year, CZM provided technical reports for the **Pie** and **Mt Alcock** properties, 12 and 45 km northwest of the Cardiac Creek deposit, summarizing mapping, prospecting, and geochemical survey results from 2011. This included anomalous Zn-Ag ± Pb values in the West Pie panel extending for 8 km along strike and ranging between 100-750 m width; anomalous Zn ± Ag values at the Creek 1 and Creek 2 showings; anomalous Ag ± Zn in the East Pie panel extending over 1.2 km of strike and 250 m width; two parallel Zn-Ag ± Pb anomalies along the Nod-Seep panel extending up to 3 km of strike, anomalous Zn-Ag ± Pb southeast of the Seep grid, and a new target southwest of the Main barite showing. The 2012 southern **Kechika Regional** exploration program followed up on these results with additional mapping and geochemistry at Pie and Mt. Alcock to improve drill target definition. Additionally, the success of a hydrogeochemical survey technique tested in 2011 that provides real-time results for visually measuring elevated sulphate downstream of baritic mineral occurrences warranted further application as a sampling tool. Over 120 additional samples were taken across the Akie, Pie, and Mt. Alcock properties with anomalous levels showing in the northern portion of Central Pie, West Pie, and Mt. Alcock. Furthermore, to obtain lithological and structural information near surface and at depth, an airborne VTEM survey was flown over the properties at 200 m line spacing, and 100 m line spacing over the Cardiac Creek deposit and West Pie target area. The company plans to develop a SEDEX EM fingerprint that it can use elsewhere in the Kechika Trough.

The Kechika Trough is an elongate southern extension of the Paleozoic Selwyn Basin of the Yukon

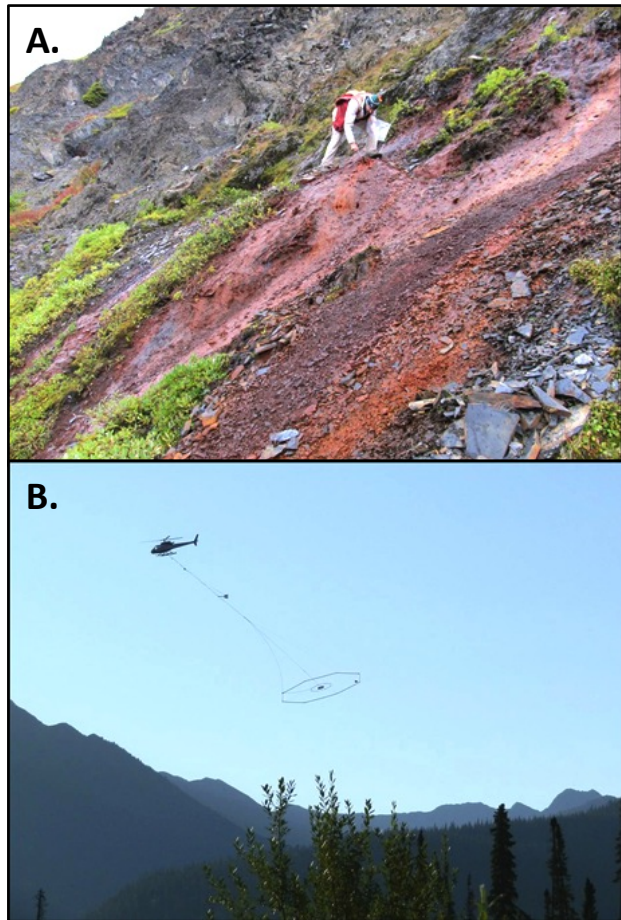


Figure 1.15. Akie project – A. Collecting a geochemical sample; **B.** Airborne geophysical survey being flown (photos courtesy of Canada Zinc Metals Corp).

and Northwest Territories, a prolific sedimentary basin for Ordovician to Early Devonian SEDEX deposits. The **Akie** and **Kechika Regional** projects together comprise mineral claims extending over 135 km following northwest trending carbonaceous shale of the Gunsteel Formation in the Devonian-Mississippian Earn Group. CZM has subdivided the Kechika Regional project into 10 major blocks from northwest to southeast: Thro, Saint, Driftpile South, Bear/Spa, Weiss, Kwad, Mt. Alcock, Yuen, Cirque East and Pie. Digital compilation of historical exploration work is underway on all properties.

1.4.4 Ultramafic-hosted Projects

1.4.4.1 Cache Creek Terrane

In April, First Point Minerals Corp provided a resource estimate for the Baptiste deposit at its **Decar** nickel alloy project, 88 km northwest of Fort St. James on the southern flank of Mt. Sydney Williams (Figure 1.16). The project is under option to Cliffs Natural Resources Exploration Canada Inc, an affiliate of Cliffs Natural

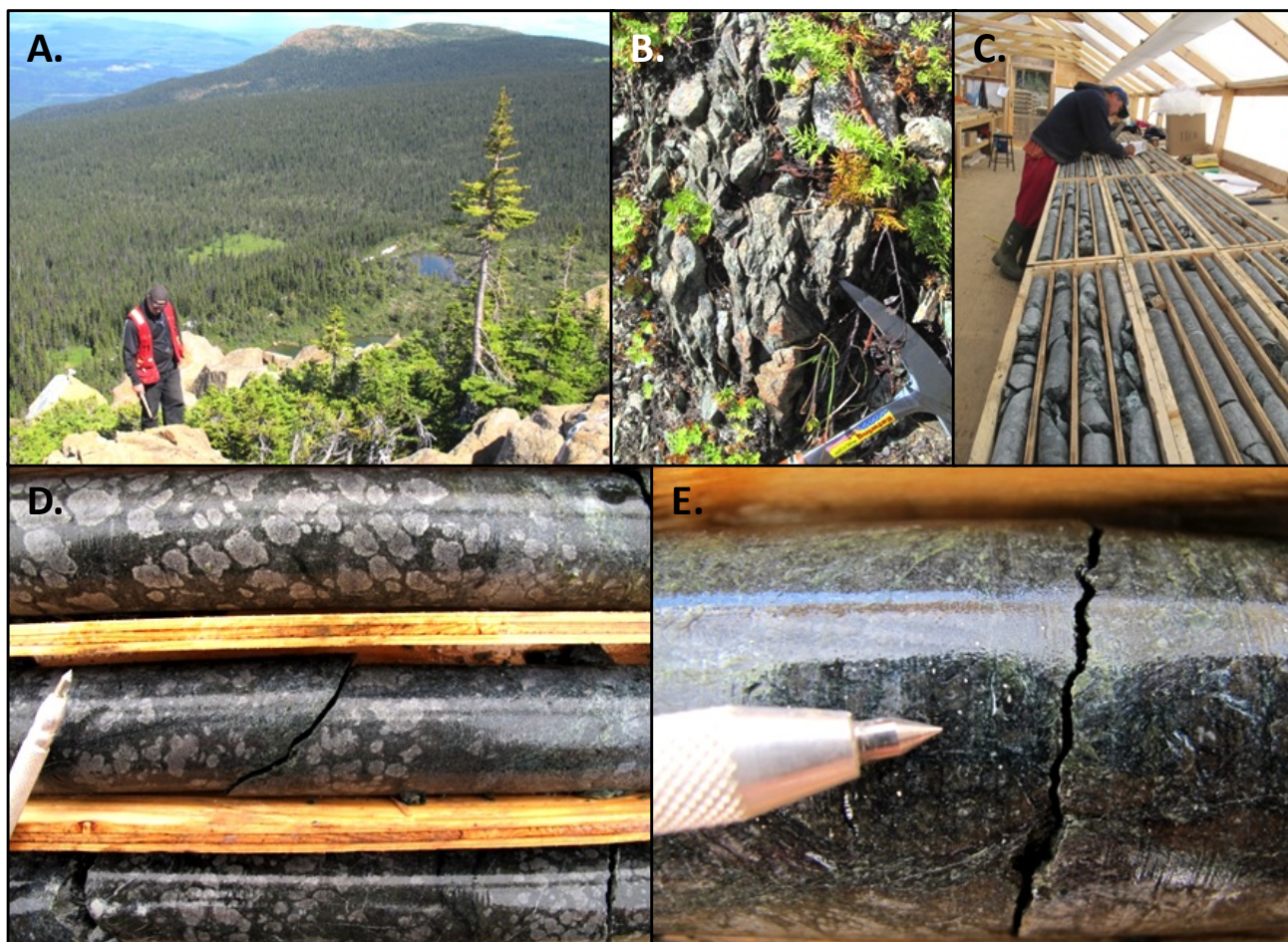


Figure 1.16. Decar project – **A.** Caracle Creek geologist Mark Rein on Mt. Sidney Williams; **B.** Foliation in serpentinite at surface (326-328°, subvertical) in NW Baptiste area; **C.** Working in the core shack; **D.** pseudo-breccia texture of serpentinite in hole 12-BAP-041. This texture (and serpentinization/mineralization) may be structurally controlled by foliation exhibited in B.; **E.** Serpentinite speckled with awaruite grading 0.136% DTR Ni in hole 12-BAP-041, 215 m.

Resources Inc (CNR), a Cleveland-based international mining company and a major global iron ore and metallurgical coal producer. In the Inferred category, the estimate of 1197 Mt averaging 0.113% Ni contains 1.35 Mt of Davis Tube Recoverable nickel at a 0.06% Ni cut-off grade. This was derived from 42 holes (12 565 m) drilled on 200-metre centers by Caracle Creek International Consulting Inc, who is supervising and managing the exploration program on behalf of CNR. The Davis Tube method is an industry standard geometallurgical test for magnetic recovery operations.

The 2012 exploration program started in June in order to: upgrade the Inferred resource to the Indicated category; extend the limits of higher-grade zones (grading about 0.15% Ni) by stepping out in the south-central and northwest areas; and drill some step-out holes on the northern boundary to explore the deposit limits. Three drill rigs (two track-mounted and one heli-supported) were turning by August, and 27 angled holes were drilled along 100-200 m centers to 600 m down-hole depth, twice the depth of previous drilling. Results extended near surface mineralization in south-central area for 380 m to

the southeast, and further defined the east-west trending higher-grade zone at 650 m by 315 - 625 m and up to 460 m depth. Eight holes for hydrological monitoring wells were also drilled. Geotechnical analysis and point-load testing was done on four hydrological holes and four resource holes. Environmental baseline studies continued, as did further metallurgical test work on a 250 tonne bulk sample collected in 2011. A PEA is underway with completion expected for March 2013. The deposit represents a potential bulk-tonnage, open-pit operable resource with minimal acid-generating potential. Initial metallurgical testing shows the Ni-Fe alloy 'awaruite' (Ni₃Fe) is recoverable using conventional two-stage grinding and magnetic separation, and does not require chemical processing. The deposit is located less than 5 km from an active branch of the CN Railway and within 110 km of the hydro power grid. Nickel is primarily used in stainless and alloy steel production.

The **Decar** property occurs in the Late Pennsylvanian to Late Triassic Trembleur Ultramafite, representing the upper mantle and lower crustal portions of an ophiolite sequence in the oceanic Cache Creek terrane. Two

northwest-trending metavolcanic panels are in fault contact with the peridotite. Two broad northwest-trending zones of mineralization occur on the property, and within these are four zones of relatively coarse (50 - 500 μm) disseminated awaruite referred to as the Sydney, Baptiste, Target B, and Van targets. The Baptiste deposit model consists of a 2.3 km long, curved sub-vertical volume of Ni-mineralized foliated and serpentinized peridotite. Mineralization is continuous over the volume, particularly in the west and central parts. The deposit remains open along strike, in the central south area, and at depth. It is bound on the southwest by a northwest-trending subvertical fault. The orebody is cut by several non-mineralized gabbro dikes ranging from 2-15 m thickness. Overburden ranges from 2 m to over 30 m depth.

First Point Minerals Corp drilled five holes at **Klow**, 137 km northwest of Fort St. James, to test a 530 m long northwest trending corridor within the 950 x 270 m main zone that shows elevated nickel-alloy values in surface sampling. Grade appears to increase to the north where drilling encountered 316 m averaging 0.1% Ni-in-alloy starting below 10 m of overburden. A ground magnetic survey for target development preceded the drilling. Serpentinized and deformed host rock with disseminated awaruite (50 - 600 μm), up to 4.9% magnetite, and 0.13% chromium, is similar to Decar. Association of awaruite with high tenor Ni-sulfides, pentlandite, heazlewoodite, and millerite has been previously reported.

Early in the year, Stratton Resources Inc collected 35 rock chip samples at **MAC** from an area 1.5 km northwest of the Pond zone that is underlain by an 11 km long cross-faulted northwest extension of the Trembleur Ultramafic Unit, similar to the serpentinite that hosts the Baptiste deposit 14 km to the east. Awaruite was identified in hand sample, with grains up to 500 μm . Davis-tube separated fractions of seven samples range from 0.25% to 0.64% Ni alloyed with iron and chromium. Additional mapping was planned.

Fort St James Nickel Corp completed a 6-hole drilling program in late 2011 at **Km 26**, 50 km north of Fort St. James, to test a 1400 x 400 m target area within a broad magnetic high. All holes encountered Ni-mineralized serpentinite, which only occurs at surface as float. Follow-up electron microprobe scans on 22 rubble samples showed mineralization is high-tenor Ni-sulfides but variable nickel-alloy is also present. Drill core and financial assistance was provided to the Department of Materials Testing at UBC where research is being conducted on the economic viability of extracting nickel from low-grade ultramafic complexes in BC. The property is underlain by Pennsylvanian to Triassic Cache Creek Group rocks (accretionary wedge and ophiolite) separated from Takla Group mafic tuffs and epiclastics by the Pinchi Fault Zone.

1.4.5 Specialty Metal Projects

1.4.5.1 Ancestral North America

In March, Taseko Mines Ltd provided a resource upgrade for the **Aley** niobium project, 130 km north of Mackenzie, with 286 Mt averaging 0.37% Nb_2O_5 (containing 739 million kg of niobium) in the Measured and Indicated category; and 144 Mt averaging 0.32% Nb_2O_5 (containing 323 million kg of niobium) in the Inferred (Figure 1.17). This represented a 170% increase



Figure 1.17. Aley project – **A.** Taseko Mines geologist Mercedes Rich at the carbonatite contact in the Saddle zone with syenite-bearing fenite breccia; **B.** Niobium ore in dolomitized carbonatite.

from the 2011 Inferred resource estimate and afforded Aley the claim of being the largest undeveloped niobium project in the world. With the updated resource able to support 25 years of operation, the company focused on advancing preliminary engineering and site planning for Feasibility, and continuing environmental baseline studies. Geomechanical drilling in the Central zone was designed to further develop a structural model, and geotechnical-condemnation drilling in the Foundex valley tested foundations for a potential tailings site, and Seepage Collection Pond facility. Early in the year, a metallurgical bulk sample was collected, and was followed by more detailed mineralogical studies to delineate ore-type domains within the Central zone. An amphibole characterization study to ascertain the distribution of undolomitized amphibole and its potential for asbestos-like mechanics was also conducted. The company anticipates completion of a Feasibility Study by early 2013 for a long-life, low-cost mining operation. Niobium is used in the manufacture of high strength, corrosion-resistant, low alloy steels (HSLA) specifically used in green technologies, turbines, aerospace, automobiles, oil and gas. Ferro-niobium (FeNb) prices fell modestly from about \$44-45 per kg in 2011 to \$40 per kg in 2012. There are only three major producers of FeNb worldwide accounting for about 99% of total reported production: two Brazilian companies and IAMGOLD which operates the Québec-based Niobec underground mine.

The Aley Carbonatite Complex is an ovoid 3-3.5 km diameter intrusion emplaced in Cambrio-Ordovician sediments of the Northern Rocky Mountain fold and thrust belt, close to the Late Proterozoic rifted margin of ancestral North America. The carbonatite has been divided into a 50 - 200 m deep zone containing magnetite-apatite-baddeleyite (ZrO₂) bands, aggregates, and disseminations that are niobium enriched, and a deeper sodic-calcic amphibole bearing zone to about 300 m depth. Niobium occurs in the minerals pyrochlore and columbite, and secondary fersmite. The intrusive has historically been divided into a rauhaugite (dolomitic carbonatite) core zone with local “sweats” of soivite (calcitic carbonatite), but petrographic work by the company suggests a post-ore dolomitization of primary soivite has occurred, leaving relict soivite domains. Syenite and albitite occur as xenoliths in carbonatite along the margins of the intrusion, and as sub-rounded, comminuted clasts in an amphibolitic fenitized breccia zone that mantles the intrusion. Offshooting carbonatite dikes interfinger with this mantling breccia. The deposit remains open at depth in the east and to the south.

In May, International Montoro Resources Inc received the results of an airborne magnetic and radiometric survey flown over the **Tacheeda Lake** project, 90 km north of Prince George. Four high-priority targets were developed with coincident anomalies prospective of syenite/carbonatite intrusives. The property is underlain by Lower Cambrian limestone and dolomite.

1.4.6 Coal Projects

1.4.6.1 Southern Groundhog Coalfield

Atrum Coal conducted a 15-hole initial drilling program at **Groundhog**, 235 km north of Smithers. Drilling tested an 83 km² area and intersected a cumulative coal average of 20 m over multiple seams. Individual coal intercepts of 1.4 - 8.2 m were encountered between 13 m and 400 m depth, with average drilling depth to 330 m. Consistent drill intercepts suggest continuity of coal units across the property. The program was designed to expand the resource from a central core area into northern and southern extensions. Over 800 samples are being tested for coal quality, and a PEA with product market assessment is planned for completion in early 2013. The resource is currently 57.1 Mt (Ind.), and 101.9 Mt (Inf.), but is expected to increase significantly upon addition of the new drilling results. The company hopes to develop an open-pit mineable resource for pulverized coal injection (PCI) metallurgical application.

The Southeast Groundhog coalfield falls within the Omineca Region boundary in the Skeena and Duti River watersheds west of Tatlatui Provincial Park, over an area of 30 x 80 km. Multiple coal seams of semi-anthracite to anthracite rank are hosted in Currier Formation mudstone, shale, and sandstone of the Upper Jurassic to Lower Cretaceous Bowser Lake Group. Historical work suggests coal-bearing sequences approach 1100 m in thickness with 33 identified coal units of up to 11.8 m in true thickness.

1.4.7 Industrial Mineral Projects

1.4.7.1 Cache Creek Terrane

Porpoise Bay Minerals Ltd conducted a 6-hole drilling program at the **Hoof** magnesium-nickel project, 20 km southeast of Vanderhoof on Sinkut Mountain (Figure 1.18). Anomalous nickel in weakly serpentinized (amphibole and talc-carbonate altered) peridotite averages 0.23-0.25% of which about 57% is in fine disseminated sulfide. A previous engineering study concluded magnesium at 24-26% is feasibly extractible using existing technology. Uses of magnesium in industry include alloying with aluminum (automotive industry), iron and steel production, and uranium production. The company plans to begin modelling the deposit. The property is underlain by a northwest trending remnant of the Cache Creek Group that has been thrust above the Early Permian to Late Triassic Vanderhoof Metamorphic Complex.



Figure 1.18. Hoof project – A. Outcrop of peridotite with Porpoise Bay Minerals' Rupert Seel in background with drill.

1.4.7.2 Ancestral North America

In late 2011 Stikine Energy Corp released a PEA for the **Angus** frac sand project, 58 km northeast of Prince George. In the report, an open-pit mine is proposed with a 1 Mt/y production rate over a 25 year life of mine, and a mill throughput of 4570 t/d. The Inferred resource is estimated at 726 Mt of (meta)-sedimentary material. The mine plan specifies a series of nine pits that will be progressively mined and backfilled with tailings, avoiding the need for an external TSF. Autogenic crushing, attrition scrubbing, and density separation will be used in processing, without chemical treatment. The Angus deposit represents a nearby frac sand source to unconventional shale-gas plays in the Horn River and Montney Basins of northeast BC. Demand for frac sand in the Montney Basin is projected to be 1.4 Mt by 2014. As a proppant, frac sand has specific size, strength, sphericity, and SiO₂ purity requirements. The PEA uses base-case and alternate-case product values of \$200-\$250/tonne. The project is focused on quartzite and quartz arenite of Upper Proterozoic to Lower Paleozoic Misinchinka, Gog, and Boulder Creek Groups following the northwest trending Mount Averil ridge.

1.5 OUTLOOK FOR 2013

Several advanced projects and mines are expected to reach significant milestones in 2013 including commercial production at the **Mt. Milligan** mine; optimized milling with resumed mining at **Endako**; final developments towards mine construction at **Kemess Underground**; completion of a Feasibility Study for **Blackwater**; advancement toward Feasibility at the **Aley** niobium and **Angus** frac sand projects; and results of PEA studies at the **Decar**, **Kwanika**, and **Groundhog** projects. There is considerable mineral potential across the region in a variety of commodities and many attractive projects with potential for development given improved global economic circumstances and venture capital accessibility. Grassroots and early stage exploration may see an upsurge as the Mt. Milligan mine and Blackwater major projects further develop.

ACKNOWLEDGMENTS

The information in this report has been sourced from news releases, company websites, technical reports, MINFILE reports, Geological Survey of British Columbia publications Bulletins, site visits and direct conversation with geologists, explorationists, and professionals who were generous with their time and resources. The writer thanks those who provided statistical and related information, and exchanged ideas, and the support of staff in the Prince George Regional Office. Additional thanks to the Regional Geologists and the Mineral Development Office for helpful support, including MDO Director Bruce Madu for reliable feedback and comment on this report, and Robin Chu for GIS support. Special thanks to Regional Geologist Jeff Kyba for accompaniment on field visits in the Nechako Plateau, and 2011 contract Regional Geologist John Degrace for initial job training and continued guidance throughout the year, including an insightful review of this report.

REFERENCES

- Friedman, R.M, Diakow, L.J., Mortensen, J.K. (2001) New U-Pb age constraints on latest Cretaceous magmatism and associated mineralization in the Fawnie range, Nechako Plateau, central British Columbia. *Canadian Journal of Earth Sciences* 38:619-637.
- Thiersch, P.C., Williams-Jones A.E., Clark J.R. (1997) Epithermal mineralization and ore controls of the Shasta Au-Ag deposit, Toodoggone District, British Columbia, Canada. *Mineralium Deposita* 32:44-57.