5th Annual Minerals South Conference & Trade Show 2009
October 27-30

Prestige Rocky Mountain Resort and Convention Centre
Cranbrook, BC

Abstracts

Mining and mineral exploration supporting our communities

Presented by

East Kootenay Chamber of Mines

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INTRODUCTION

Delegates to the 2009 Minerals South conference will be provided with a program agenda at the time they pick up their registration packages. There will be NO hard-copy of abstracts. Submitted abstracts are available on-line at the Chamber website and attendees may print off any they might wish to have on hand.

Abstracts in this document represent both oral and poster presentations, and are listed alphabetically by senior author. Not all presenters chose to submit an abstract, and so this compilation does not reflect the entire program. However, the full agenda can be found elsewhere on the website.

This version was compiled on October 20.

Please note that in compiling this document formats have not been adjusted and minimal editing has been done. The East Kootenay Chamber of Mines does not claim or accept ownership of, or responsibility for, any of the contents herein.

Thank you for your interest and support. See you next year in the beautiful West Kootenays, where the Chamber of Mines of Eastern BC will organize and host another memorable conference.

THE EAST KOOTENAY CHAMBER OF MINES
TGI-3 Cordilleran Project in southeastern BC: New exploration targets and looking ahead

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ABSTRACT

In the final year of the 5 year Targeted Geoscience Initiative 3 (TGI3) Cordilleran project in southern British Columbia, the objective is to present maps, models and new ideas to stimulate exploration for sediment-hosted Zn-Pb and porphyry base metal deposits in the western miogeocline, Purcell Basin, Kootenay Arc, Monashee Complex, Nicola Arc and suites of Cretaceous plutons. These outputs derive from 32 research and survey activities scattered across the southeastern Cordillera and set the stage for development of future activities proposed under a collaborative, co-funded, exploration-related geoscience program in southern B.C.

We present a summary of the project’s contributions which relate to new syntheses of sediment-hosted Zn-Pb and porphyry base metal deposits in the southeastern Cordillera.

Zn-Pb synthesis
Prospective areas for sediment-hosted Zn-Pb deposits include environments in the miogeocline, Purcell basin, Kootenay Arc, Monashee Complex and Eagle Bay Assemblage. Exploration risk for the various deposit types in these varied geological environments is reduced by:
* publication of seamless geological maps in paper and digital form;
* completion of two 1:50K scale maps in the miogeocline and associated geochronology of sills (potential heat engines for development of mineralized dolomite diatreme breccia units);
* publication of series of formerly proprietary maps and detailed data-sets associated with the Sullivan SEDEX district;
* completion of project identifying and characterizing late Proterozoic and Mesozoic sulphide-bearing veins in Sullivan district;
* stratigraphic, structural, geochemical and geochronological studies of prospective “rift sag” facies to identify major tectonic disruptions, which may be related to SEDEX potential in the Sullivan district;
* searchable data archive of geology, alteration, drill hole location, mine sections and grade/tonnage information for the Sullivan Mine;
* evaluation of Purcell basin for (stratabound) Cu and (sill-associated) Ni-Cu-PGE potential and IOCG (Iron Range) potential via mapping, structural, mineralogical, alteration, and geochemical studies on whole rock and mineral samples;
* reassessment of carbonate-hosted sulphide and nonsulphide Zn-Pb (±Ag) showings, prospects and former mines in southern Kootenay Arc and comparison with classic Irish-type and Mississippi Valley-type deposits;
* mapping, and geochemical analyses associated with new SEDEX-type barite discovery in black shales of the northern Kootenay Arc (completed);
* completion of detailed mapping, geochemical and geochronological work on the basin architecture of lower and middle Paleozoic rocks in the northern Kootenay Arc to identify structures contemporaneous with base metal mineralization;
* completion of the GSC-GBC-industry funded multiparameter geophysical survey in southern Kootenay Arc;
* compilation and assessment of drill-hole and rock property information from proprietary database completed;
* completion of user-customizable, web-based metallogenic maps for the Purcell Anticlinorium and Kootenay Arc (available through BCGS Map Place), and
* contributing to preservation of drill core library on Vine property.

Porphyry base metal synthesis
Risks to mineral exploration for further porphyry Mo deposits similar to the MAX Mine in the northern Kootenay Arc were reduced by:
* publication of detailed and regional maps of the Max Mine area;
* detailed compositional, age, alteration and structural description of the MAX porphyry Mo mine; and
* biogeochemical sampling over the MAX mine and in unexplored areas adjacent to it to identify new exploration targets.

Public Geoscience
* publication of GeoTour West Kootenays and GeoTour East Kootenays, which aim to tell geoscience stories and help develop the social licence for mineral exploration and mining
Nox Fort Project – Intrusion-related Gold-Bismuth-Tellurium, Salmo BC

Bruce Ballantyne, Jaxon Minerals Inc
J. David Williams, consulting geological engineer

Nox Fort is an Au-Bi-Te Property, 8700 hectares in size, owned by Clarke Gold of Calgary AB, and held under option by Jaxon Minerals of Vancouver BC. The Property is located about 15km southwest of Salmo BC. The Property’s history goes back to the staking of crown grants in 1897 where the Bunker Hill Mine, in what is now the center of the Property, operated intermittently to 1943. Recorded production from its three levels the mine amounted to 393 tonnes, some of which had been sorted, yielding a calculated average of 8.5 gm/tne Au & 24 gm/tne Ag.

Bedrock geology is widely variable with only local exposures of outcrop. In general the geology of the Nox Fort Property consists of Cambrian sediments of ancestral North America and overlying Kootenay terrane rocks in fault contact with the mostly volcanic rocks of Quesnellia. That fault system, the Waneta thrust, runs northeasterly through the center of the Property and separates Cambrian sediments that prevail in the southeast of the Property, from Jurassic volcanics that predominate in the northwest. That fault contact is obliterated by mid-Cretaceous granitoids of the Bunker Hill intrusive and the much larger Wallack Creek Stock which occupies the northeast of the Property and beyond. Poorly understood and perhaps unappreciated for their mineral potential, are at least two bodies of Slide Mountain? ultramafic rock that occur in the central part of the Property.

The Bunker Hill intrusive appears to be a crucial controlling feature of the distribution of mineralization in the Bunker Hill Mine area. It is a rectangular body at least 1500m in length and 200 to 400m wide. Much of the best known mineralization is associated with the north-south trending west contact. Several Au-Bi-Te quartz veins in the Bunker Hill Mine area occur at or near the intrusive contact, as does the mineralization of the Lefevre Skarn, a hornfelsic zone with skarn alteration at least 100m long and as much as 30m wide. The Lefevre Skarn generally contains the same commodities as the quartz veins along with tungsten.

Gold remains the commodity of interest but its association with Bi & Te in the Bunker Hill mine area has forged a new appreciation for the Property’s mineral potential. Targeted mineralization in the Bunker Hill Mine area is now recognized as an example of a Reduced Intrusion-Related Gold [RIRGS] system which is characterized by intrusion-hosted, proximal deposits of sheeted arrays of thin, low-sulfide quartz veins with an Au-Bi-Te-W signature. The RIRGS deposit model may be best known from mineral occurrences in the Tintina Gold Belt in Yukon and central Alaska. One of the principal deposits in that gold belt is the large, low-grade Fort Knox operating mine in Alaska. The RIRGS model allows for deposits of varying styles to be generated from a causative granitoid intrusive. Those include quartz veins, sometimes occurring in swarms, skarn zones, replacement and disseminated bodies and a mineralized assemblage that is zoned with distance from the intrusive. Many of these characteristics are known in the Bunker Hill Mine area and recognition of many of the rest could be just beginning.

Contacts of the Bunker Hill intrusive, and a number of other intrusives, all thought to be outliers of the much larger Wallack Creek stock are, everywhere on the Property, potential targets. Where observed, the contacts are often irregular or lobate in nature and suspected to show a similar characteristic at depth.

Other, probably unrelated occurrences Nox Fort Property include the small Bluestar Au-Cu-Ag-Pb-Zn, showing that has implications for mineral potential in rocks underlying the west side of the Property. The Nox Fort Property is large enough to enclose the former Red Rock mine, a modest former producer of Pb-Zn-
Ag. These occurrences and other illustrate the potential for locating a number of deposits of diverse geologic models and variable metal assemblages on the Property.

In 2008, a 92-day field program consisted of 3,227 samples sent in for analysis. That sampling concentrated on the Bunker Hill Mine area (highlights tabulated below) as well as reconnaissance sampling from most areas of the Property. The results of that work outlined numerous targets in addition to targets identified but not pursued by earlier workers. In 2009, a smaller field program followed up on some of the targets outlined last year and those results are pending.

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Out of that 2008 fieldwork came an appreciation of the west contact of the Bunker Hill intrusive as a high-priority drill target. The first phase of drilling, a program 2500m in size, is expected to be nearing completion as of this event (late October 2009). That program is intended to test both the Bunker Hill veins and the Lefevre Skarn would be the best tool to assess the grade and continuity of mineralization along the intrusive contact. Based on the results of that drilling, a second phase is expected for 2010.
Geology and exploration of the Thor deposit, Trout Lake, British Columbia

John Gardiner, Jim Helgeson and George Kent, Taranis Resources Inc

The Thor Project consists of 27 Crown Grant Mining Claims and other various mining interests located 4 km northeast of Trout Lake, British Columbia. Thor encompasses four historic prospects/mines that are known as the Broadview, Great Northern, True Fissure and St. Elmo which were explored and operated intermittently from 1895 to the 1980’s.

Taranis acquired the property in 2007 and has conducted extensive drilling (152 drill holes) and geophysical surveying on the property. The resulting database created from this recent exploration work has been used to create a geological model for the Thor deposit. Silver, gold, zinc, lead and copper occur entirely within a single horizon known as the Combined Metals Unit (“CMU”). Minerals that form the CMU are chiefly quartz, ankerite and pyrite, but also include variable amounts of sphalerite, galena, chalcopyrite and tetrahedrite.

The CMU occurs within the Broadview Formation in the uppermost part of the of the Lower Paleozoic-age Lardeau Group. The Broadview Formation occurs along the west limb of the Silver Cup Anticline, and at Thor the stratigraphic sequence is now overturned. Both the CMU and enclosing sedimentary rocks have a moderate dip to the east, and both have been strongly deformed parallel to a lineation that plunges northward and was subjected to late-stage faulting. The CMU exhibits great continuity along strike and down-dip, and pre-dates structural deformation.

The structural hanging-wall assemblage of the CMU consists of metasediments, with a significant amount of volcanioclastic material. This horizon appears to correlate with a green agglomerate/tuffaceous volcanic unit described by Fyles and Eastwood (1962) found outside of the property, suggesting that the CMU has a volcanic affiliation. The structural footwall assemblage is composed of argillaceous metasediments that are frequently graphitic.

The lack of any intrusive rocks and confinement of the CMU to a single layer for upwards of 2 km provides additional evidence that the Thor deposit has syngenetic origins – but that strong structural overprints have given the deposit a “vein-like” appearance. The recognition that Thor may have syngenetic origins has important implications for exploration (at a property and regional level) and suggests the presence of additional lodes in fold repetitions both down-dip of existing deposits, and to the north where the deposit remains open.
THE WICHEEDA CARBONATITE-SYENITE BRECCIA INTRUSIVE COMPLEX
HOSTED RARE EARTH DEPOSIT
A Significant New Discovery in the Search for an Important North American Source of Rare Earth Minerals to meet their Increasing Demand and Strategic Role in the future Economy

Chris Graf, Spectrum Mining Corporation
Bob Lane, Plateau Minerals Corp
Murray Morrison, M.S. Morrison Geological

The Wicheeda Property is owned 100% and operated by private company Spectrum Mining Corporation and comprised of 17 mineral claims totalling 6011.53 hectares in the Cariboo Mining Division of British Columbia. It is located approximately 80 km northeast of Prince George within the Rocky Mountain Trench on the continental Arctic-Pacific, Parsnip River – Fraser River, drainage divide and topographical arch. The Wicheeda property is situated close to major infrastructure including power transmission lines, railway and major highways. It is readily accessible from Prince George by travelling highway 97 for 80 km north to the community of Bear Lake and then going east for 50 km along the all weather Chuchinka Forest Service Road.

The Wicheeda Carbonatite-Syenite breccia intrusive complex is presently of undetermined age. No radiometric age dates have been obtained and it is likely related to the Devono-Mississippian group of alkaline/carbonatite intrusive bodies emplaced into the old North American continental margin which roughly follows the Rocky Mountain Trench. There are several intrusive carbonatite bodies in the Wicheeda area which form a northwest-southeast trend over 15 km long and 2 km wide. These intrusive rocks are emplaced into sediments that are tentatively assigned to the upper Cambrian to Ordovician Kechika Group, however that assumption has not been substantiated through modern mapping by the GSC and may be incorrect. The sedimentary rocks exposed on the Wicheeda property are a sequence of interbedded limestone, siltstone, calcareous argillite and argillite with consistent northwest trending attitudes and subvertical dips. The intrusive rocks of the Wicheeda “Main Zone” consist of a massive dolomitic-ankeritic body that overlies a thick monolithic syenite breccia unit. The carbonatite body outcrops over most of its extent with little to no overburden cover and is quite coarse grained with individual dolomite-ankerite phenocrysts up to 5 cm across. Minor constituents include K-spar, black biotite, corderite, pyrochlore, columbite, magnetite, pyrite and limonite as well as coarse grained, rare earth enriched, monazite and a bastnaesite-synchisite-parasite mineral. The syenite breccia clasts vary up to 30 cm in size and perhaps more. The spaces between the clasts are infilled or mended by dolomitic carbonatite identical in composition to the overlying massive carbonatite body. The relative amount of syenite breccia clasts to carbonatite matrix infilling material varies from 10% clasts and 90% carbonatite to 90% clasts and 10% carbonatite. No true intact syenite body has been discovered on the property to date.

At one drill site approximately 400 m north of the “Main Zone” drill holes have intersected the same syenite breccia unit, however the carbonatite matrix infilling material is calcite instead of dolomite and the individual clasts are rimmed by up to ½ cm of black biotite. This rock is quite striking to observe.
The first reported mineralization in the Wicheeda area were zinc showings discovered by prospector Kol Lovang in the late 1970’s and more detailed assays of his rock samples indicated they contained significant niobium contents. The niobium potential interested Teck Corporation and from 1985-1987 they conducted follow up geological mapping, surface soil sampling and blast trenching exploration programs that outlined several areas enriched in the lanthanide suite of light rare earth elements as well as niobium, barium, strontium, zinc and fluorine. The “Main Zone” soil anomaly as outlined by the 400 ppm cerium soil contour is 1km long and up to 500m wide within which the 5000 ppm contour is roughly 300m long and 200m wide. Peak values range up to 25,000 ppm cerium. Several other high value cerium soil anomalies continue for over 600m northwest along strike from the “Main Zone”. These cerium soil anomalies are also anomalous in niobium and barium. A ground magnetometer survey has outlined a magnetic high anomaly on the north side of the “Main Zone” measuring roughly 500m north- south and 1 km east-west.

These mineral showings and soil anomalies were never tested by drilling and the claims were eventually allowed to lapse. In 2001 the property was restaked by the author Chris Graf who subsequently incorporated Spectrum Mining Corporation to fund and conduct drilling on the indicated rare earth mineralized targets.

In 2008 Spectrum Mining Corporation contracted Falcon Drilling Ltd. of Prince George, B.C. to drill 4 BTW size diamond drill holes, totalling 866 m, at varying azimuths and dips from 1 drilling platform into the “Main Zone” cerium soil anomaly. All 4 drill holes intersected significant rare earth mineralization over drill core lengths varying from 66 m to 231 m starting at their collars. The highest grade intersections from the 2008 program include a 48.64 m interval in hole 2008-02 which averaged 13,570 ppm (1.36%) cerium, 17,806 ppm (1.78%) lanthanum, 1,344 ppm (.13%) praseodymium and 2,780 ppm (.28%) neodymium for a combined rare earth element content (REE) of 3.55% over 48.64 m.

Spectrum Mining Corporation shareholders regarded these initial results to be sufficiently encouraging to fund a larger drilling program designed to expand the tonnage of the Wicheeda deposit and contracted Falcon Drilling Ltd to conduct the work. In 2009, eleven NTW diamond drill holes totalling 1835 m were drilled into the “Main Zone’ from 2 new drilling platforms. All eleven drill holes intersected significant rare earth mineralization and the Wicheeda deposit remains open in all directions.

Drill site 2009-A is located approximately 100 m northeast of the 2008 drill site and seven 150 m long drill holes were completed from it at various azimuths and dips. All seven holes intersected significant intervals of rare earth mineralization varying from 56 m to 148 m long starting at their collars.

Drill site 2009-B is located approximately 100 m north of drill site 2008-A and approximately 150 m northeast of the 2008 drill site. Four drill holes were completed from it at various azimuths and dips. Again all four holes intersected significant intervals of rare earth mineralization varying from 95 m to 147 m long starting at their collars. Examples of some of the intersections are 144 m averaging 12,924 ppm (1.3%) Cerium, 6,403 ppm (.64%) Lanthanum and 2,599 ppm (.26%) Neodymium in hole 2009-09 (2.2% REE over 144 m) and 72 m averaging 18,310 ppm (1.83 %) Cerium), 7,296 ppm (.73%) Lanthanum and 3,547 ppm (.35%) Neodymium in hole 2009-07 (2.92% REE over 72 m).
An important economic aspect is that the “Main Zone” outcrops on the front of a readily accessible ridge with little to no overburden which would allow it to be mined by an open cut with basically no strip ratio.

In 2009 Spectrum also completed three diamond drill holes to test two separate cerium- niobium soil anomalies within the Carbonatite-Syenite breccia complex approximately 400 meters north of the “Main Zone”. Two of these drill holes from one drill site intersected up to 150 meters of calcium dominated carbonatite-syenite breccias with lower grade rare earth assays. One drill hole on a separate target intersected a 15 m thick interval of dolomite carbonatite identical to the “Main Zone” which contained significant amounts of rare earth mineralization.

World recognized carbonatite-rare earth mineralization specialist Anthony Mariano visited the Wicheeda project during the 2009 drilling program and has subsequently examined drill core samples as well as rock samples that he collected on the site. His analytical work including SEM and cathodoluminescense indicates that the Wicheeda mineralization is mainly quite coarse grained (0.2 mm to 0.5 mm) monazite and a bastnaesite-synchisite-parasite mineral. He has also conducted a bench scale heavy liquid and magnetic separation study on a composite sample of Wicheeda drill core and was able to produce a high grade REE concentrate that contained 56.09 wt. % REE. This test indicates that the Wicheeda rare earth mineralization is simple and easy to produce a marketable concentrate from compared to most other world rare earth deposits including the dormant world class rare earth mine at Mountain Pass in California. By also applying a flotation circuit it should be easy to produce a 60% LREE concentrate from Wicheeda which would exceed the concentrate grade from Mountain Pass which for over 40 years was main North American mine supplier of rare earth products to the world.
Geological setting of sediment-hosted Cu+/Ag+/Co in the Purcell Supergroup

Russell Hartlaub, Department of Mining and Mineral Exploration, BCIT

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The majority of sediment-hosted stratabound Cu deposits are formed within continental rift basins due to movement of moderately low pH and oxidized fluids within permeable, shallow-water sedimentary and, more rarely, volcanic rocks. Copper, silver, cobalt, lead, and other metals are leached from minerals within the sedimentary and/or igneous rocks, carried elsewhere and precipitated. The Paleoproterozoic Belt-Purcell Basin has rift-fill and rift-cover sediment thickness of at least 19 km within the central part of the basin. This large thickness of sediment was deposited in a relatively rapid period leading to the formation of numerous sediment-hosted stratabound Cu-Ag occurrences in the quartzite dominated Revett Formation. These deposits, including the Troy, Rock Creek and Montanore, are all located in western Montana (Figure 1). However, evidence for sediment-hosted copper mineralization has recently been identified in the Creston Formation south of Cranbrook. New lithogeochemistry indicates that siliciclastic rocks in the area contain variable, but significant, amounts of copper and form a rich reservoir from which Cu may have been extracted. Significant sediment-hosted Cu occurrences are also associated with rift-related flood basalts and dikes of the Nicol Creek Formation. A new detrital zircon study confirms a ca. 1440 Ma age for this rift-related mafic magmatism.

Thick glacial drift in the Cranbrook area requires exploration techniques that help identify concealed mineralization. Fifty samples of lodgepole pine bark samples were collected to test biogeochemical methods of exploration. The environment of the Cranbrook Trench appears to make lodgepole pine bark a viable and useful exploration procedure for providing focus to more detailed exploration activities.
Mining and Exploration 1955 to Present: Some Lessons Learned

M. A. Kaufman, Prospector/Geologist Principal DV Co.

The 1950’s Scene:

Exploration mainly by prospectors and majors, but some significant junior activity. Prior to this period, majors just followed prospectors around, but starting in the 50s majors began setting up exploration staffs in regional offices, and doing their own exploration with the emergence of geophysical and geochemical prospecting. There was difficulty in finding qualified exploration personnel, as no one had really done this before. Some of the active North American majors were Kennecott, American Metals, Anaconda, Asarco, Phelps Dodge, Cominco, Noranda, Inco, Falconbridge, Selco and Placer Development. Interestingly, not one of these companies survives in its original form.

Some geological shibboleths of this time:

The concept of continental drift/plate tectonics was thought by most geologists to be kooky.

Although volcanogenic massive sulfide deposits had been mined for years, and new ones were being found, most geologists believed that they were simply replacement type deposits.

The geophysical signature of massive sulfide deposits had to be a conductor of limited length, say 250 metres or so, and had to be coincidental with a mag anomaly. If it was longer than the prescribed distance, and had no associated mag, then it was graphitic and useless.

Surface showings of viable porphyry copper deposits in the American Southwest had to consist of a leached capping of certain color and texture.

Why should it get better at depth?

Some important discoveries of this time:

Brunswick Mining base metals-silver by the Boylen Group, a Junior

Thompson Nickel Belt by Inco by geophysics

Mattagami, base/precious metals by junior company by geophysics

Highland Valley Copper by a prospector

Ambrosia Lake, New Mexico uranium by a prospector/wildcatter

Pima/Mission Copper, Arizona by a geophysical contractor using ground mag

Safford, Arizona copper; the story of Michael Fitzgerald as follows:

The Story of Michael Fitzgerald: Sent out to Safford by employer PD to drill some assessment holes on a property that it acquired by upper management, which exploration thought was useless. Surface outcrops were ugly, massive black volcanic porphyry cut by fractures with weak chrysocolla. No area of any size at surface would assay
more than 0.2% Cu. Two holes selected for assessment. The first, at 20 foot depth ran into cuprite, which washed away near surface, and was in ore grade for 3000 feet until it was stopped. This is now Freeport-McMoran Safford Copper Mine. Lesson Learned: This property would have been considered a zero priority by any exploration company of that time, including Phelps Dodge, which acquired it. It was discovered later that the black, massive volcanic was intensely and pervasively altered by secondary biotite.

Stories of Ambrosia Lake: Though the Colorado Plateau was crawling with geologists looking for uranium, the original discovery here was by septuagenarian oil widcatter Stella Dysart and her partner Louis Lothman who was by trade a jeweler. It was found by their putting a Geiger counter to cuttings on one of Stella’s old wildcat holes on the Ambrosia Dome. This led to grid drilling all over the region with discovery of numerous paleo channel deposits, which would comprise the largest uranium resources ever found in the U.S. Ore was in the Westwater Member of the upper Jurassic Morrison Formation, which was sandwiched between shale beds.

My experience in ore reserve calculations here erroneously and inadvertently delineated a type of deposit not previously known, which were later called “stacks.” these were pipe-like bodies of higher grade which formed by movement of radioactive waters up and down intersecting fault and fracture zones.

The original Dysart discovery on the Ambrosia Dome was above the water table and easily amenable to trackless mining, but much of the district was below the water table. None of the original exploration holes had been surveyed so when we drove to ore bodies they often weren’t there, and mining trackless in the soft, Westwater acqurifer with shale above and below was a disaster. It took one great mining man to finally rescue this (FUBAR) fiasco.

Lessons Learned: Rigid ideas about ore formation, and what ore bodies should look like often are wrong. Developing mines is one of the most difficult of human endeavours, and will not likely succeed if not managed by the most extremely competent and experienced individuals.

A quick look at Yellowknife before it was capitol of the NWT, before diamonds and before highway access.

Buried/Blind Porphyry Deposits

Vekol Hills Copper mid 1960’s: Discovery at relatively shallow depth of a porphyry copper deposit overlain by small outcrop of pre-mineralization rock, which would have inspired no one to drill. Probably the first porphyry in which IP was critical to discovery. The only evidence for a possible porphyry in this area was some weak copper and copper/zinc skarn showings in the Vekol Hills bounded by pediment.

Lessons Learned: 1) This is truly a blind porphyry where the erosion level did not quite reach the ore body, and the overlying rock was very uninspiring. Perhaps the most significant facet of this discovery is that it illustrates how large ore bodies can be concealed by sedimentary sections. 2) Another zero priority prospect. If you believe in a prospect, no matter who and how expert the people that oppose you, drill it.

Later similar discoveries:

Mount Emmons, Colorado 1970’s: This is probably the richest undeveloped porphyry molybdenum deposit in the world. This is another blind porphyry now controlled by Thompson Creek Metals, discovered by Amax in 1970s. The rock overlying the porphyry deposits which are from 460 to 820 metres depth are mainly hornfelsed shales, sandstones and limey siltstones which contain unimpressive disseminated pyrite and pyrrhotite. The only surface
evidence of molybdenum is a very small breccia pipe overlying the smaller of the deposits in Redwell Basin, and a small breccia dike overlying the large resource under Red Lady Basin. In both cases there are very minor molybdenum showings in rhyolite fragments, and in both cases the breccias are thought to be later than the ore bodies. The deposit under Red Lady Basin is a contact related stockwork draped over a granite porphyry intrusion. It contains a very large resource grading .29% Mo, and at a .12% cutoff contains 167 million tons at .228% Mo. Ref: Thomas and Galey, 1982 Exploration and Geology of Mt. Emmons, Econ. Geology V. 77.

The Mother of All Blind Porphyry Deposits (Resolution Copper), present time: Currently under development by Rio Tinto. The initial discovery was made in 1990’s by Magma Copper. It is adjacent to the Magma Copper mine, which produced +2.35 billion pounds of copper, +40 million oz. of silver and 795,000 oz. of gold chiefly from manto ore grading + 5% Cu. A block to the south of the mine is overlain by post-mineral volcanics and sediments. Magma geologists drilled vertically through the post-mineral cover to prospect for more high grade deposits similar to the mine. They encountered pervasive alteration with some alteration throughout the underlying Mesozoic sediments, prompting them to believe that a porphyry deposit might occur below. They followed up with a longhole to the south from the Magma workings. This hole found sericitized sediments and intrusives with abundant pyrite and several hypogene chalcocite veins. This encouraged a deeper longhole, which after hitting sericite/pyrite came into biotite altered rocks containing strong porphyry-style chalcopyrite. Announced resource for Resolution is 1.34 billion tons of 1.51% Cu and .04% Mo. Ref.: Scott Manske “How To Shoot An Elephant”; Geoff Ballantyne, Tim Marsh, et. al., Kennecott Exploration paper; The Resolution Copper Deposit.

Perry, Knox, Kaufman/Knox Kaufman: In 1969 geologists Al Perry, Jim Knox and I formed a new company. Our modus operandi was to design exploration projects, and carry them out for exploration companies, for which we received lesser pay than normal consultants, but a royalty interest in the event of a discovery.

Discussion: Candelaria Mine, Nevada; DeLamar Mine, Idaho and Trinity Mine, Nevada

DeLamar. How it was found. A rhyolite/dacite dome complex. Trinity. How it was found.

My involvement in B.C.: A large part of my work from 1970 to 1988 was in B.C., and since then 100% of my effort has been here.

Brief Discussion re Afton Deposit, Kamloops M.D.

Brief discussion re Jake Property, Kamloops M.D., Star, Jazz and Gus properties, Nelson M.D.
New geological compilation maps raise the syngenetic sulphide potential of the Lardeau Group near Trout Lake, B.C.

Authors:
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Affiliations:
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Several 1:50 000 scale geological compilation maps in the Lardeau west-half map area, southeastern British Columbia, have been updated on the basis of bedrock mapping in 2006-2008 under the GSC’s Targeted Geoscience Initiatives-3 (TGI-3) Cordilleran Project. Associated Ph.D. research has advanced the understanding of Paleozoic stratigraphy exposed in the northern Kootenay Arc with positive implications for the syngenetic sulphide potential of the area.

The meta-volcanic-sedimentary Lardeau Group of early Paleozoic age which hosts the area’s numerous historical vein-hosted Pb-Zn, Ag, and Au mines was deposited in a two-sided, extension fault-controlled basin informally known as the Lardeau trough. Lardeau Group strata between Trout Lake and Revelstoke, British Columbia, were likely deposited in a basin margin environment characterized by lateral facies and thickness changes and exhalative vent activity temporally associated with basaltic volcanism in the basin. This depositional setting is favourable for SEDEX or VHMS mineralization, which is evident regionally in the Goldstream VHMS Cu-Zn mine to the north and the possible VHMS character of the polymetallic Thor Property (Taranis Resources Ltd) to the east, and is suggested by bedded barite within the study area. High-grade vein deposits in the Lardeau mining district could be indicators of syn-deformational remobilization of larger undiscovered syngenetic sulphide deposits within the Lardeau Group.
THE ROLE OF MINERALOGY IN EXPLORATION

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In the last 20 years a great revolution has taken place in the world of mineralogy that shows no signs of stopping. This revolution has been propelled by the advancement of Automated Scanning Electron Microscopes (SEM) (i.e. MLA & QemSCAN) that were developed to carry out rapid identification and association of mineral constituents of a feed sample used in mineral processing testwork. As a result these units have provided metallurgists with rapid and inexpensive means to understand the ores that they are beneficiating and have thus been well entrenched in the characterization of ores in processing laboratories. This has provided a spotlight to focus on the need to understand the orebody early on in the mining cycle and has resulted in such disciplines as Geometallurgy. It is this advancement that now highlights the different mineralogical needs of exploration. Traditionally mineralogy carried out during an exploration program would be limited to X-ray Diffraction of drill core assay reject and occasionally some petrographic analysis to assist in rock identification and petrogenesis of the deposit. With the incorporation of automated SEM’s into the commercial laboratory, it is possible to incorporate more detailed mineralogical analyses into the exploration program. In particular the MLA technology offers the exploration geologist a variety of differing measurement tools that can be applied to the various stages of exploration. This instrument can now provide routine mineral abundance, grain size and mineral association data. Ultimately data can be gathered to produce mineral release curves for liberation studies and grade recovery curves for predictive mineralogy.

This paper will examine the role that Mineralogy and the use of the MLA can play in areas of exploration including geochemical RIMS (Resistate Indicator Mineral Suite) identification, diamond drill core analysis, geometallurgical data population, and petrogenesis and alteration detail.
Seabridge Gold’s Kerr Sulphurets Mitchell (KSM) Project in NW BC

Michael J. Lechner, Resource Modeling Inc
Jim Gray, Moose Mountain Technical Services

The Kerr Sulphurets Mitchell project area in NW British Columbia is situated about 950 km northwest of Vancouver, 65 km north-northwest of Stewart, BC and 21 km south-southeast of the Eskay Creek Mine just west of the Highway 37 corridor. The area is rugged mountainous terrain with glaciers and is in the west coast snow belt. It has been prospected in the 1930’s and exploration and studies conducted since the 1960’s. With Seabridge’s involvement in 2000, the Kerr Sulphurets project has been significantly expanded to include the adjacent Mitchell deposit. NI 43-101 technical reports have been prepared by Seabridge including a Preliminary Assessment (PA) updated in September 2009 to include the 2008 exploration and technical field investigation data. A Pre-Feasibility is currently underway for completion in early 2010.

The property lies within an area known as “Stikinia”, which is a terrain consisting of Triassic and Jurassic volcanic arcs that were accreted onto the Paleozoic basement. Early Jurassic sub-volcanic intrusive complexes are scattered through the Stikinia terrain and are host to numerous precious and base metal rich hydrothermal systems. These include several well known copper-gold porphyry systems such as Galore Creek, Red Chris, Kemess, and Mt. Milligan. The KSM project is termed a deformed Au-Cu porphyry.

The current studies envisage a large tonnage open-pit mining operation at 120,000 metric tonnes per day of mill feed using the largest proven shovel and truck capacities available. The mine will haul to a pit side crusher and grinding facility followed by a slurry line to the plant in the next valley, via a 23 km tunnel. A flotation mill will produce a combined gold/copper/silver concentrate for transport by truck or pipeline to the nearby deep-sea port at Stewart, B.C. A separate molybdenum concentrate and gold-silver dore will also be produced at the processing facility.

Two mine plans are considered in the September 2009 PA: (i) a 30 year mine life designed to maximize NPV, and (ii) an extended 45+ year mine life based on larger pits designed to maximize total undiscounted resource recovery. Both cases follow a similar development path and capital payback occurs in the same time frame for both scenarios. The 30 Year scenario will be used in the preparation of a Preliminary Feasibility Study and in Seabridge’s ongoing permitting program.

<table>
<thead>
<tr>
<th>Mineralized Material &gt; Cutoff (ktonnes)</th>
<th>Insitu Grades</th>
<th>Waste (kt)</th>
<th>S/R (t/t)</th>
<th>Copper (million Lbs)</th>
<th>Au (million Oz)</th>
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<tr>
<td></td>
<td>NSR ($/t)</td>
<td>Cu (%)</td>
<td>Au (g/t)</td>
<td>Ag (g/t)</td>
<td>Mo (%)</td>
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<td>30 yr Case</td>
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<td>0.210</td>
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<td>45 yr Case</td>
<td>$19.8</td>
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<td>0.588</td>
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Life of Mine Annual Production:

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<tbody>
<tr>
<td>Gold (ounces)</td>
<td>644,000</td>
</tr>
<tr>
<td>Copper (pounds)</td>
<td>176 million</td>
</tr>
<tr>
<td>Silver (ounces)</td>
<td>2.2 million</td>
</tr>
<tr>
<td>Molybdenum (pounds)</td>
<td>2.0 million</td>
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<tr>
<td>Average onsite operating cost</td>
<td>US$10.57 per tonne</td>
</tr>
</tbody>
</table>

This talk will review the geology and resource modeling estimates, show the engineering challenges to create an economic and environmentally sensitive operation in this rugged and remote location, and give a summary of the project development schedule. More details can be found on Seabridge’s website www.seabridgeweb.net or the full Technical Report is available at SEDAR.com.
Mineralization, intrusions and facies controlled by basement structure, southeastern British Columbia

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Intermittently active old structures in the crystalline basement underlying the southeastern Canadian Cordillera have exerted an important influence on the subsequent sedimentary, intrusive, deformation and mineralization history. The most important structures formed during Paleoproterozoic and Archean growth and assembly of the underlying crystalline basement and are oriented transverse to the Cordilleran structural trend. Other structures, oriented subparallel to the Cordilleran structural trend, formed during Mesoproterozoic, Neoproterozoic or Cambrian rifting events. Much mineralization in the lower Purcell including the Sullivan Mine formed in areas where both transverse and basin parallel structures were active. The importance of the transverse Vulcan Low basement domain in localizing mineralization, intrusions and major thickness and facies changes in the southern Purcell Basin and Kootenay Arc has been recognized for some time. New work suggests a more northern transverse basement structural zone at the north end of the Archean Hearne province had a similar effect. In this area, Pb-Zn showings, the southeast end of the Cambrian and Ordovician carbonate facies (Kickinghorse Rim), a cluster of Late Ordovician - Early Devonian diatreme breccia pipes, and a series of anomalous northeast-trending faults form a northeast-trending zone extending across the Rocky Mountains. These features palinspastically restore to original positions directly above a major crustal boundary in the North American craton and its along strike projection. Intermittent activity along this basement structure localized facies changes, intrusions, mineralization and subsequent structural trends in the Rocky Mountains, facies changes in the northern Purcell Basin, and normal faults under Kootenay Lake. Activity along this basement structure likely influenced younger intrusions and mineralization above its westward extension in the Kootenay Arc. Old transverse basement structures form prospective targets for mineral exploration, particularly in stratigraphic metallotects and where basement structures intersect.
Cross River sills, Rocky Mountains, southeastern British Columbia

McMechan, Margot, Anderson, Bob, Richards, Barry, and Davis, Bill; Geological Survey of Canada; 3303 33rd St. NW Calgary, Alberta T2L 2A7; mmcmecha@nrcan.gc.ca

Dioritic sills up to 40 m thick intrude carbonates and argillites of the Mount Docking Formation (middle Chancellor Group) along the Cross River. Sills are folded with the regional structure and crosscut by numerous nearly perpendicular quartz veins that locally contain minor chalcopyrite. Contact metamorphism has extends a few metres into the host rock. Recent mapping discovered dioritic to gabbroic sills in the Mount Docking Formation along the Albert River and at Fenwick Creek. These locally contain abundant pyrrohtite and are cut by numerous barren quartz veins.

At Cross River a small zone of medium crystalline plagioclase-hornblende diorite was found and sampled for age dating. It contained no zircon. The hornblende had very low K content, excess Ar and produced highly disturbed spectra with non-interpretable results. Apatite fission track analysis indicates cooling in the early Tertiary and structural relationships require their intrusion by the Early Cretaceous. Trace element compositions help characterize sills and dykes intruding the Chancellor Group and thin sills intruding the overlying McKay Group and tuffs in the Latest Devonian Exshaw Formation.
My talk will deal with the history of the “Boundary Mining Camp” from the earliest placer gold discoveries in 1859 or 1860, through the early exploration and small scale lode mining activity and the discovery of the large copper – precious metal deposits such as Phoenix and Mother Lode, and culminating shortly after the shutdown of the smelters following WWI. The story of the long slow period, followed by Phoenix “rising from its own ashes” as did the bird in legend, is left for another time.

My focus is not on the geology of the region or of the deposits, but rather on the development of the region, involving such topics as: the early problems of transportation; the development of infrastructure including the incorporation of three cities in 1897; the coming of the railways; the development of electric power grids; the development and operation of the copper smelters at Grand Forks, Greenwood, and for a short time at Boundary Falls; and other topics of generally historical interest.
Relevance of Aeromagnetic Data to Revision of Geological Maps, Purcell Anticlinorium

M.D. Thomas and D.A. Brown

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2: Strategic West Energy Ltd., 7339 Tomlinson Road, Saanichton, BC, V8M 1S8

Regional aeromagnetic data provide one of the few data sets having sufficiently detailed resolution and distribution to contribute to geological mapping at “conventional” scales such as 1:250,000 or 1:50,000. Resolution, of course, is key to whether a magnetic data set can provide meaningful input into a geological map at a specific scale. In southeastern British Columbia compilation of a block of 12 geological maps at a scale of 1:50,000 is presently being undertaken as part of the Targeted Geoscience Initiative Program. These will provide cover of a large segment of the Purcell anticlinorium between 49° and 50°.

The compilation incorporates information acquired principally from earlier government mapping in certain areas (generally at 1:50,000 scale), and by Teck Cominco Ltd. during an extended period of exploration for SEDEX deposits.

Aeromagnetic data contribute to this compilation through evaluation of correlations between geologically mapped units and magnetic signatures, and by provision of detailed magnetic images where the terrain is poorly mapped. New geological information obtained in this manner can be integrated into the new maps. About 25% of the compilation area is covered by high resolution aeromagnetic data (400 m line-spacing; 60 m flight elevation), which provide detailed images of the magnetic field, in turn revealing fine details of the geology in three survey areas, known as Findlay Creek, St. Mary’s River and Yahk.

The entire area is covered by lower resolution aeromagnetic data collected in 1969/70 as part of Canada’s National Aeromagnetic Mapping Program (805 m line-spacing, 305 m flight elevation). These data have been reprocessed to yield reasonably high quality magnetic images that can make a considerable contribution to geological mapping, particularly when derivative images are used. The two magnetic data sets (high and low resolution) provide significant insight into different aspects of the geology, and also raise questions, which can only be answered by ground follow up.

Magnetic signatures reflect compositional zoning and marginal phases in various igneous intrusions, define unmapped faults, point to unmapped subunits within broader units, and indicate repositioning of certain geologically mapped contacts. For example, the Mount Skelly Pluton is characterized by an internal magnetic low surrounded by a wide magnetic high reflecting a marginal phase, and superposed finer details of the magnetic field indicate a northwest oriented structural grain, probably reflecting faulting.

Examples of correlations between geology and magnetic field are examined for various features within the compilation area, and discussed in terms of the geological significance of the magnetic signatures for geological mapping.