



AME ROUNDUP.

TECHNICAL SESSIONS ABSTRACT GUIDE

Vancouver Convention Centre East
January 28-31, 2019

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Roundup 2019 takes place on the unceded territories of the Coast Salish people, including the lands of the xʷməθkʷəy̓əm (Musqueam), Skwxwú7mesh (Squamish) and səliłwətaʔ /Selilwitulh (Tseil-Waututh) Nations.

MONDAY AM 2019 REGIONAL OVERVIEWS: BC/YUKON/ALASKA

TIME: 10:20 AM – 12:00 PM

SPONSORED BY: Geotech Drilling Services Ltd.
SESSION CHAIR: Jonathan Buchanan, AME

This signature session will provide an update on mineral exploration and mining activities in British Columbia, Yukon, and Alaska. The content will link the latest geoscience information with the latest mineral exploration and mining industry activities. This session is geared to providing prospectors, exploration geologists, engineers, miners, financial analysts, investment organizations and senior industry leaders with a solid foundation and a vision to succeed. Please join us as we celebrate the successes of the past year in mineral exploration and mining, and gear up for the discoveries ahead.

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Mineral Exploration and Mining in British Columbia, 2018

Gordon Clarke, BC Ministry of Energy, Mines and Petroleum Resources

TIME: 10:25 AM – 10:50 AM

Mineral and coal production continued to be a major contributor to the economy of British Columbia in 2018. More than 80% is forecast to be from combined coal and copper production. The Willow Creek coal mine was reopened in July by Conuma Coal Resources Limited. In September, Coeur Mining Inc. declared commercial production for the Silvertip silver-zinc-lead mine restart. Also in September, Nyrstar NV restarted their zinc-copper-lead-silver-gold mine. Pretium Resources Inc. reported robust economic results for its Brucejack gold mine, which began operation in 2017.

A number of high-profile projects continued to advance. A provincial environmental assessment certificate was issued for IDM Mining Ltd.'s Red Mountain gold-silver project. A federal certificate was anticipated for late 2018 or early 2019. Centerra Gold Inc. received a Mines Act permit for their Kemess Underground copper-gold-silver project. HD Mining International Ltd. received Mines Act approval for its Murray River coal mine project.

Significant metal exploration programs continued in British Columbia. Exploration expenditures that had rebounded in 2017 continued on an upward trend. Highlights include a new porphyry discovery by GT Gold Corp. at their Tatogga project, a new porphyry discovery by Golden Ridge Resources Ltd. at their Hank project, a new copper zone at Surge Copper Corp.'s Ootsa project, high-grade copper intersections at Sun Metals Stardust project and high-grade gold results for Westhaven Ventures Inc.'s Shovelnose project and Aben Resources Ltd.'s Forest Kerr project.

Exploration continued to return good results for established projects including Seabridge Gold Inc.'s KSM project, Kwanika Copper Corporation's Kwanika project, Copper Mountain Mining Corporation's New Ingerbelle project, Imperial Metals Corporation's Ruddock Creek project, Garibaldi Resources Corp.'s Nickel Mountain project, Kutcho Copper Corp.'s Kutcho project, Dolly Varden Silver Corporation's Dolly Varden project, Skeena Resources Ltd.'s Snip and Eskay Creek projects and Ascot Resources Ltd.'s Premier/Dilworth project.

Yukon Geology, Exploration and Mining Overview, 2018

Scott Casselman, Head of Minerals Geology, Yukon Geological Survey

TIME: 10:50 AM – 11:15 AM

Mineral exploration in Yukon remained strong in 2018. Exploration expenditures exceeded C\$114 million and development expenditures were C\$8 million. This is a significant increase over 2017 levels.

The significant investment is being led by the development of the Eagle gold mine by Victoria Gold Corp. The mine, also known as Dublin Gulch, is located north of Mayo. The company broke ground in August 2017 and is on track for production in the fall of 2019.

Exploration for gold continues to be the driver of exploration activity, with 81% of exploration spending directed to the search for the precious metal. The White Gold district, Rackla gold belt and Dawson Range are the three dominant gold exploration regions in Yukon.

Although the price of zinc is below the highs set in February 2018, the price remains above the 5 year average, and stockpiles of the metal continue to dwindle. This shortfall is reinvigorating the base-metal explorers. BMC Minerals is progressing with the environmental assessment on the Kudzu Ze Kayah VMS project. Fireweed Zinc continued work on its Mac Pass project, which hosts the Tom and Jason sedimentary exhalative deposits, and Selwyn Chihong Mining Ltd is advancing the massive Selwyn project.

The Yukon Geological Survey (YGS) is focused on supporting the exploration and mining community. The YGS has been busy digitizing, compiling and posting legacy exploration data online as well as providing a regional geological framework to help companies achieve continued exploration success.

Alaska's Mineral Industry Activity In 2018

Melanie Werdon, Chief, Mineral Resources Section; Geological Scientist, Alaska Division of Geological & Geophysical Surveys

TIME: 11:15 AM – 11:40 AM

Alaska's diverse metallogenic provinces, underexplored mineral-resource potential and world-class gold, copper, lead, zinc and coal deposits continue to attract exploration capital. Alaska's estimated total exploration spending in 2018, including near-mine, advanced-exploration, development-stage and early exploration projects is approximately US\$125 million (about C\$167 million). A total of 19 projects spent more than US\$1 million (about C\$1.3 million). In 2018, Alaska had 5 active lode-metal mines (Red Dog, Fort Knox, Pogo, Kensington and Greens Creek), 1 coal mine (Usibelli), more than 235 placer mines and 12 advanced-exploration and development-stage projects (eleven active; five with drill programs).

Increased claim staking, deal making and drilling in 2018 reflects company optimism about Alaska's mineral potential. At the end of 2018, Alaska had more than 41 active early-stage exploration projects statewide, primarily focused on gold and base metals. Exploration drilling programs were carried out at the Arctic, Aktigiruk, Bornite, Dawson Mine, Estelle, Golden Zone, Graphite Creek, Herbert Gold, Honolulu, Icy Cape, Luna, Luna East, Palmer, Pebble, Quicksilver, Red Mountain, Round Top, Shorty Creek, Terra, Valdez Creek and Zackly properties, as well as at the Fort Knox, Pogo, Kensington and Greens Creek mines.

The Alaska government encourages resource development by providing geological datasets and maps, airborne geophysical surveys, Alaska Industrial Development and Export Authority partnerships with private entities to finance infrastructure and permitting coordination efforts led by the Large Mine Permitting Team.

MONDAY PM NEW GEOSCIENCE:

TIME: 1:15 PM – 4:00 PM

SPONSORED BY: OceanaGold Corporation

SESSION CHAIR: Steve Irwin, Natural Resources Canada; Fil Ferri, BC Geological Survey

The New Geoscience Session showcases the results of frontline geoscience initiatives bringing forward new ideas on the regional geology of the Cordillera and their bearing on mineralization. Topics will range from regional syntheses of important metallotects to focused studies highlighting new investigative approaches.

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Early Mesozoic Terrane Paradox in the Northern Cordillera: Implications for Mineralized Terranes and Overlap Assemblages

Alex Zagorevski, Research Scientist, Geological Survey of Canada

TIME: 1:20 PM – 1:40 PM

The northern Cordillera comprises a collage of terranes that were accreted to the North American continental margin. Each terrane has its own stratigraphy, tectonic history and mineral deposits, and is bounded by faults. Identification of terranes in the Cordillera during the 1980s revolutionized the understanding of orogenic systems and continues to guide tectonic analysis of orogens and mineral exploration; however, inadequate modern understanding of some of the Cordilleran terranes, general lack of recognition of primary synaccretionary sutures and improper assignment of late faults as terrane boundaries necessitate a reassessment of the Cordilleran terrane framework. Using the Cache Creek Terrane as an example, I will outline how oceanic terranes were previously defined and demonstrate that, although revolutionary at the time, they do not conform to modern tectonic concepts. I will demonstrate that the Cache Creek Terrane is composed of at least two distinct terranes that were juxtaposed by a Middle Triassic and Middle to Late Triassic overlap assemblage. The overlap assemblage is correlative to the Stuhini–Lewes River–Nicola arc. This is consistent with some previous studies that interpreted the Stuhini and Nicola arcs as overlap assemblages on top previously deformed terranes. Recognition of the Middle to Late Triassic overlap in the Intermontane Superterrane has important implications for understanding the tectonics and the mineral endowment of the Cordillera. Primarily, re-evaluation of the Cache Creek Terrane highlights the need to re-examine other ‘oceanic’ and ‘arc’ terranes, their boundaries and their significance. Secondly, Paleozoic and early Mesozoic mineralized sequences may extend across currently drawn terrane boundaries. Lastly, Late Triassic to Early Jurassic calcalkalic and alkalic porphyry deposits did not form in intra-oceanic arcs, but rather in postcollisional successor arc sequences.

Latest Targeted Geoscience Initiative Research Results on Sediment-Hosted Base Metal Sulfide Deposits

Michael G. Gadd, Postdoctoral Research Fellow and Jan M. Peter, Research Scientist, of Geological Survey of Canada; Daniel Layton-Matthews, Associate Professor, Isobel Crawford, MSc student, Claire Leighton, MSc student, and Krebchov Haimbodi MSc student, of Queen's University

TIME: 1:40 PM – 2:00 PM

The authors present results from TGI research on hyperenriched black shale (HEBS) Ni-Mo-Zn-PGE-Au-Re deposits and sedimentary exhalative (SEDEX) Zn-Pb-(Ag-Ba) deposits.

North Yukon is host to several occurrences of HEBS Ni-Mo-Zn-PGE-Au mineralization, including Nick and Peel River. The redox conditions of marine water columns and sediments are thought to be a primary controlling factor in HEBS formation. To evaluate the ambient paleoenvironmental conditions, several robust lithogeochemical proxies have been applied to HEBS mineralization and host rocks. Additionally, traditional (sulphur) and non-traditional (molybdenum and thallium) stable isotopes have been measured in host rocks and mineralization to provide insights into metal and sulphur sources. Collectively, the data reveal that water column conditions during background sedimentation were suboxic. The HEBS sulphide mineralization, however, was precipitated in anoxic to euxinic conditions at or close to the seafloor in the sub-surface. The molybdenum and thallium isotopic values of the Peel River sedimentary rocks and HEBS mineralization, together with the other bulk paleoredox indicators and REE, indicate that the molybdenum and thallium were both sourced from seawater. Highly negative sulphur isotope compositions show that biogenically reduced seawater sulphate was the ultimate source of reduced sulphur in the mineralization. Laser ablation-ICP-MS reveals that pyrite within HEBS is the predominant mineral host for precious metals (palladium, platinum, gold, rhenium). Precious metals are absent in late-stage pyrite-marcasite veins, which effectively constrains the relative age of mineralization to diagenesis.

Research on SEDEX deposits has focused on pyrite chemistry in the MacMillan Pass zinc-lead-silver-barium district. Four pyrite generations are identified in mineralized and distal, age-equivalent, unmineralized rocks: syn-sedimentary (Py1), diagenetic (Py2), hydrothermal (Py3), and metamorphic (Py4). Significantly, a SEDEX mineralizing element suite (Co-As-Ag-Bi-Tl-Pb-Zn) is recognized within Py3 in the distal (2-4 km), unmineralized samples. This recognition suggests that pyrite chemistry in MacMillan Pass may be useful in vectoring toward concealed mineralization.

Lithogeochemistry and Lead isotopes in Shales Associated Volcanogenic Massive Sulfide (VMS) Deposits and their Applications as Exploration Vectors: New Results from the Wolverine VMS Deposit

Stephen J. Piercy, Professor, Department of Earth Sciences, Memorial University of Newfoundland; Balz S. Kamber, Professor, Queensland University of Technology, Queensland, Australia

TIME: 2:00 PM – 2:20 PM

A major challenge in the exploration of sedimentary basins is the use of lithogeochemistry as a vectoring tool. This presentation will focus on whole-rock lead-isotope and high-precision trace-element data for shales from the Wolverine deposit to illustrate their potential utility as an exploration vector. Shales exhibit distinct variations in time-integrated uranium-thorium-lead evolution with proximity to mineralization. Distal shales have Cordilleran upper crustal lead-isotope compositions (i.e., shale curve lead). More proximal samples (approximately tens of metres) exhibit evidence for hydrothermal activity but are not significantly mineralized, have very high uranium-thorium and uranium-lead ratios and anomalous present-day $^{206}\text{Pb}/^{204}\text{Pb}$ (> 20) ratios coincident with elevated yttrium-holmium, zirconium-hafnium and carbonate alteration. These signatures were imprinted on the shales by oxygenated, CO_2 -rich hydrothermal fluids that contained uranyl carbonate ions (e.g., $\text{UO}_2(\text{CO}_3)_3^{4-}$), due to shallow-level (within 50 m of the seafloor), near-vent ingress of oxygenated seawater associated with hydrothermal venting. Samples most proximal to mineralization (< 10 m) have trace-element signatures (i.e., high yttrium-holmium, zirconium-hafnium, CO_2 -uranium enrichment) inherited from seawater, but they do not exhibit anomalous present-day $^{206}\text{Pb}/^{204}\text{Pb}$ ratios, being more juvenile in $^{206}\text{Pb}/^{204}\text{Pb}$, $^{207}\text{Pb}/^{204}\text{Pb}$ and $^{208}\text{Pb}/^{204}\text{Pb}$, and containing base- and volatile-metal enrichments (e.g., lead, zinc, copper, thallium, Antimony, Tungsten, tin [$\pm$ copper, molybdenum]). The juvenile lead associated with the shales proximal to mineralization argues for deep penetrative circulation of hydrothermal fluids and/or influence from juvenile magmas at depth. Both of these processes were likely critical for the genesis of mineralization at Wolverine. This study has illustrated the utility of quadrupole ICP-MS for providing sufficiently precise and accurate lead isotope determinations for district-scale metallogenic evaluations. Furthermore, the coupling of solution ICP-MS lead isotopes with high-precision trace-element geochemistry from the same sample digestion provides a powerful tool for regional exploration studies for hydrothermal mineralization in shale basins.

Twopete Fault: A Prospective Corridor for Syngenetic and Epigenetic Mineralization in the Southern Selwyn Basin

Rosie Cobbett, Project Geologist, Yukon Geological Survey

TIME: 2:20 PM – 2:40 PM

The Selwyn Basin is a part of the western Laurentian margin that was dominated by deposition of slope and basinal facies from the Neoproterozoic to middle Paleozoic. It is bounded to the southwest by Silurian to Middle Devonian carbonate rocks of the McEvoy-Cassiar platform. In the northeast Glenlyon area, the Twopete fault is a major thrust fault that is inferred to mark the transition from basinal to platformal facies. It separates middle to late Paleozoic continental slope facies in its footwall from lower Cambrian (?) to Ordovician, variably metamorphosed clastic and volcanic strata in its hangingwall. It is also spatially related to two subparallel belts of Late Devonian and Cretaceous intrusions.

Detailed mapping along the Twopete fault provides evidence that it was a synsedimentary fault that controlled deposition of Upper Devonian clastic sedimentary and volcanic rocks. Fossils collected during mapping provide constraints on the position of the Twopete fault; Ordovician fossils were found in its hangingwall and Late Devonian fossils in the footwall. This in turn shows that known mineralization is hosted in Upper Devonian sedimentary strata in the immediate footwall of the Twopete fault, suggesting a genetic link between mineralization and the fault, a relationship that can be traced for approximately 100 km to the southeast.

Mid-Cretaceous plutons exposed in the footwall of the Twopete fault are locally coincident with mineral occurrences. At Dromedary Mountain, a buried intrusion is imaged in regional aeromagnetic surveys and coincides with occurrences of polymetallic veins and a pyrrhotite-pyrite halo at surface. This relationship between epigenetic mineralization and Cretaceous intrusions continues to the southeast.

These features suggest that the Twopete fault is a long-lived, crustal-scale structure that defines a prospective corridor with potential for Late Devonian syngenetic mineralization similar to Macmillan Pass, replacement-style mineralization, and mid-Cretaceous vein-style mineralization similar to the Keno Hill district.

Late Triassic – Jurassic Magmatism, Metallogeny and Tectonics in Yukon

Maurice Colpron and Patrick Sack, Yukon Geological Survey; and Nikolett Kovacs, Pembridge Resources

TIME: 2:40 PM – 3:00 PM

Late Triassic to Jurassic granitoid plutons that intrude the Intermontane terranes are associated with prolific copper-gold porphyry deposits in British Columbia. They extend into southern Yukon, where Early Jurassic plutons host an unusual style of high-grade copper-gold mineralization at Minto and Carmacks Copper. A regional study of Late Triassic–Jurassic plutons in Yukon aimed to characterize the various magmatic suites and identify exploration vectors for Minto-style mineralization.

The Stikine suite (ca. 217–214 Ma) is composed of mainly small, melanocratic monzodiorite to quartz diorite plutons that were emplaced at high crustal levels into Upper Triassic volcanic rocks of Stikinia. They are geochemically and isotopically juvenile and are locally associated with porphyry and vein-style copper mineralization. The Minto suite (ca. 205–195 Ma) intrudes Stikinia and the Yukon-Tanana terrane in central Yukon and comprises variably deformed granodiorite that was emplaced at lower crustal depths (6–7 kbar) during accretion of the Intermontane terranes. High-grade copper-gold mineralization at Minto and Carmacks Copper is hosted in variably migmatized mafic xenoliths within Early Jurassic granodiorite. A detailed study of the Carmacks Copper deposit shows that the protolith and mineralization are both Late Triassic and that migmatization resulted in upgrading the original porphyry mineralization. Granodiorite and granite of the Long Lake suite (ca. 188–182 Ma) were emplaced at shallower crustal levels (3–5 kbar) during continued convergence and development of the syncollisional Whitehorse trough. Trace-element patterns and isotopic analyses of the Minto and Long Lake suites show decreasing subduction influence and increasing crustal contamination consistent with syncollisional emplacement. The Middle Jurassic Bryde suite (ca. 172–168 Ma) is composed of postcollisional, alkalic plutons ranging from monzonite to syenite and granite that were emplaced at high crustal levels into Stikinia, Cache Creek and Whitehorse trough. They locally host porphyry copper mineralization (Mars) and their juvenile isotopic signatures combined with regional surface uplift reflect lithospheric delamination or slab breakoff.

A Regional Stratigraphic Framework for the Nicola Group, Southern British Columbia

Paul Schiarizza, Larry Diakow and Mitch Mihalynuk, Senior Minerals Geologists, British Columbia Geological Survey

TIME: 3:00 PM – 3:20 PM

The Nicola Group (Triassic) is the predominant volcano-sedimentary component of the Quesnel arc terrane in southern British Columbia, where cogenetic intrusions are the progenitors of numerous porphyry copper±gold–molybdenum–silver mines and prospects. Recent studies of the Nicola Group in the Bonaparte Lake–Quesnel River and Princeton–Merritt areas are integrated to provide a regional stratigraphic framework for the group: some rocks previously included in the eastern part of the group are reassigned to the Slocan Group, and those retained as Nicola Group are subdivided into three assemblages (lower, middle and upper).

The lower assemblage is recognized mainly along the northeastern edge of the Nicola Belt, where it is composed of Middle Triassic chert and siltstone with intercalations of volcanic sandstone and rare lenses of pillowed basalt. Elsewhere, the late Middle Triassic is represented by rhyolite (238 Ma) and pillowed basalt distributed along the arc axis between Merritt and Princeton.

The middle assemblage (Carnian and early Norian) is the most widespread component of the group and consists of pyroxene-phyric basalt and breccia and locally predominant volcanic sandstone and conglomerate derived from these, or similar, volcanic rocks. In the Merritt area, a distinctive marker unit in the upper part of the middle assemblage includes rhyolite (224 Ma) intercalated with limestone and rare siliceous sinters.

The upper assemblage (late Norian–Rhaetian) contains polymictic conglomerate with plutonic clasts, red feldspathic sandstone and a variety of volcanic rocks, including analcime basalt, hornblende-bearing basalt, coarse-bladed plagioclase-phyric andesite (204 Ma) and crystal-ash tuff that contains quartz, biotite and apatite grains (202 Ma). It reflects significant unroofing of the arc, and may be separated from underlying rocks by an unconformity. Monzonite to diorite plutons emplaced during this same time period host many porphyry copper-gold deposits, including currently producing mines at Copper Mountain, New Afton and Mount Polley.

New Bedrock Mapping in the Hogen Batholith, Quesnel Terrane: Integration of Geology, Geophysics, and Geochemistry

Luke Ootes, Senior Minerals Geologist, Gold, BC Geological Survey; Dejan Milidragovic, Senior Minerals Geologist, Nickel, BC Geological Survey; Anika Bergen, Senior Assistant BC Geological Survey

TIME: 3:20 PM – 3:40 PM

The Hogen batholith, in the north-central Quesnel Terrane, is a composite Mesozoic plutonic complex that hosts porphyry- and vein-style mineralization, including the Lorraine and Kwanika copper-gold deposits. To the north and east, the batholith intruded volcanosedimentary rocks of the Takla Group, Quesnel Terrane. To the west, the batholith was juxtaposed against the Cache Creek and Stikine terranes during Cenozoic dextral strike-slip motion along the Pinchi fault.

In 2018, the BC Geological Survey initiated a 1:50,000 scale bedrock mapping project of the northern Hogen batholith and surrounding area. The project coincides with the release of regional airborne magnetic and radiometric data by Geoscience BC. The BC Geological Survey used these data to assist with bedrock mapping but, during feedback, found that field observations helped establish the significance of variability in geophysical properties, both within and between bedrock units. Geochemical results will help quantify this variability.

Current and previous mapping identified four distinct plutonic suites in the northern Hogen batholith (in order of decreasing age): Thane Creek, Duckling Creek, Mesilinka, and Osilinka. The Thane Creek suite consists of diorite to monzodiorite, with lesser tonalite and quartz monzonite to granodiorite, and is altered and deformed. The Duckling Creek suite consists of syenite to monzonite, with lesser pyroxenite is deformed. The Mesilinka suite is composed of granitic rocks and is deformed. The Osilinka suite is also composed of granitic rocks but is undeformed. Both the Thane Creek and Duckling Creek suites host porphyry-style copper-gold mineralization and the Osilinka suite has local porphyry-style molybdenum and vein-hosted gold mineralization. The Mesilinka suite appears barren. The bedrock mapping and geophysical data refine the geographic distribution and temporal relationships of these suites, and help advise on areas of potential mineralization.

Bacteria, Hydrocarbons and Seismic Pumping: Discovering Intrusion-Related Mineralization in Canada

Peter Winterburn, Research Chair in Exploration Geochemistry, Mineral Deposit Research Unit, University of British Columbia

TIME: 3:40 PM – 4:00 PM

Mineral exploration in Canada is becoming increasingly complex because the majority of undiscovered commodities are likely deeply buried beneath significant glacial overburden and bedrock, reducing the effectiveness of existing tools. The development of innovative exploration protocols and techniques is imperative to the continuation of discovery success. Research at the Mineral Deposit Research Unit (MDRU) at The University of British Columbia has demonstrated the viability of process-driven exploration geochemistry by developing predictive models for anomalous responses at the surface. Three applied research components will be presented:

- In till directly above kimberlite intrusions, bacterial responses including decreasing species variety, propagation of niche species and suppression of other species is evident, allowing for the construction of multiple genetic fingerprints above mineralization as a discovery tool. Gaseous components from the weathering of the intrusion are believed to be responsible for the changes.
- Long-chain hydrocarbon responses are evident over porphyry mineralization and crosscutting structures in a variety of environments from glacial till to arid deserts. The generation of these signatures is considered directly related to the changes in bacterial populations.
- Predictive soluble element geochemical signatures are evident above structures crosscutting through mineralization and reactivated through till by consistent tectonic activity. These signatures are essentially endemic to tectonically active areas but are generally ignored as a potential exploration tool.

TUESDAY AM THE BC COPPER ADVANTAGE - 2019 THEME SESSION

TIME: 9:00 AM – 12:00 PM

SESSION CHAIRS: Craig Hart, Mineral Deposit Research Unit (MDRU), University of British Columbia; Adrian Newton, Skeena Resources Ltd.

As Canada's largest producer of copper, British Columbia is not only an attractive jurisdiction for mineral exploration but is also leading the way in promoting a green, electrified economy. This session will address many of BC's advantages, including its amazing geology and exploration potential, the availability of cheap and reliable energy, the presence of a skilled workforce, and innovative applications that have potential to improve the economics of deposits.

PROGRAM

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The Business of BC Copper: Past and Future Perspectives

Dr. Michael Doggett, President, Beach Meadows Resources

TIME: 9:05 AM – 9:35 AM

Since the mid-1970s, copper has made a significant contribution to the mineral economy of British Columbia in terms of production value, capital investment in mine development and exploration expenditures targeting new discoveries and advancement of known deposits. Approximately 14 million tonnes of copper metal has been produced in the province during this period, which at today's prices has a gross value of US\$85 billion (about C\$114 billion).

From a forward-looking perspective, the long history of copper and exploration and mining in BC is a mixed blessing. BC has inherent advantages related to existing infrastructure, experienced mining professionals and knowledgeable financial and educational institutions. Similar to other relatively mature mining jurisdictions; however, BC faces the increased cost and time challenges of reserve replacement.

The average time from discovery to production of copper mines globally over the past three decades has been more than 20 years. This has been true in BC as well. As a result, the business of copper in BC for the foreseeable future will hinge not on new discoveries but on our ability to move the current pipeline of known deposits through to production. The sunk costs of past exploration and development activities will drive this process.

Geological Diversity in BC Porphyry Copper Deposits

Craig Hart, MDRU Director, Mineral Deposit Research Unit, University of British Columbia

TIME: 9:35 AM – 10:05 AM

BC's economic copper deposits are almost entirely dominated by porphyry copper deposits—large-tonnage, low-grade, intrusion-related mineral deposits that also host associated molybdenum, gold and silver. Most of BC's copper porphyry deposits are related to two distinctive intrusive suites: calc-alkalic and alkalic suites that formed in two different tectonic settings (syn-arc and post-subduction) during two separate periods (late Triassic to Middle Jurassic and late Cretaceous to Eocene) and within or across two dominant accreted terranes (Quesnellia and Stikinia).

Calc-alkalic suite-associated metal tenor is dominated by copper-molybdenum (Highland Valley, Gibraltar, Brenda), copper-molybdenum-gold-silver (Island Copper, Schaft Creek) and lesser copper-gold (Kemess, KSM). Alkalic suite deposits range widely in alkalinity, from silica undersaturated to high-potassium quartz-phyric, but are all characterized by a copper-gold assemblage (Galore Creek, Copper Mountain, Afton-Ajax, Mount Polley, Red Chris) and are thus richer in gold and lack molybdenum. These deposits are distinctively restricted to the early Jurassic in both terranes—and thus confirm magmatic, metallogenic and tectonic links between Quesnellia and Stikinia—but are notably slightly younger than the larger copper-molybdenum systems.

The late Cretaceous to Eocene deposits formed behind the arc in a post subduction setting across the assembled Cordillera and thus individual deposits are hosted by a variety of older country rocks. They also have a spectrum of metal associations: copper-molybdenum (Huckleberry, Berg), copper-gold-molybdenum (Bell, Granisle, Prosperity) and molybdenum (Endako, Boss Mountain, Kitsault, Quartz Hill), notably with increased molybdenum and lacking alkalic associations and significant gold enrichments.

Copper enrichments are related to metasomatic and magmatic processes that occurred in the mantle wedge above the subducting slab and in the lower crust of the primitive late Triassic island arcs. This copper endowment was retained and subsequently remobilized to contribute to porphyry-copper deposit formation through a thicker, more evolved crust during younger magmatic and ore-forming events.

BC Hydro: Powering BC's Mining Industry

Sam Jones, Manager Customer Interconnections & Policy, Chris Heminsley, Senior Manager, Business & Economic Development and Gordon Gray, Senior Key Account Manager and Mining Sector Lead, Customer Service, of BC Hydro

TIME: 10:05 AM – 10:30 AM

BC Hydro is a commercial Crown corporation owned by the Province of British Columbia and regulated by the BC Utilities Commission. BC Hydro supplies clean reliable electricity to more than 95% of the Province's population at one of the lowest rates in North America. It has more than 12,500 MW of installed generation capacity (11,440 MW hydroelectric) and more than 98% of the energy is generated from clean, renewable resources.

The mining industry and BC Hydro have a long history of working together to help promote economic growth in the province. There are currently 18 operating mines connected to the BC Hydro system; these mines represent roughly 8% of BC Hydro's total load, and more than 30% of the industrial load. The Highland Valley Copper mine is, in fact, our 2nd largest customer site. BC Hydro has extensive experience working with both large and small mining projects throughout the mine development life cycle and understands the needs of the mining industry.

The Northwest transmission line, a 345 km, 287 kV transmission line, was completed in July 2014 with the goal of opening the region north of Terrace (the Golden Triangle region) to economic development. This example demonstrates the benefit of BC Hydro, the Province and the mining industry working together.

Similar to mining developments, the process of connecting a new mine to the BC Hydro power grid ('interconnection') can vary significantly depending on the size and location of the proposed mine. It is important to start the conversation at the right point during project planning to ensure a project's power needs can be met in the required timeframe. This presentation will provide more insight into the interconnection process, BC Hydro industrial rates and BC Hydro's current and planned economic development initiatives.

BC Hydro has a very reliable and robust system and we look forward to working with you to provide clean and renewable power to your projects.

Mining Methods and Sorting Systems to Upgrade BC Porphyry Mines

Dr. Bern Klein, Norman B. Keevil Institute of Mining Engineering at University of British Columbia

TIME: 10:40 AM – 11:00 AM

Abstract not available at print deadline.

Geology of the Red Chris Copper-Gold Porphyry Deposit – Lessons and Insights

Chris Rees, Geologist, Imperial Metals; K. Brock Riedell, Consulting Geologist

TIME: 11:00 AM – 11:30 AM

Red Chris is one of British Columbia's newest metal mines and was the first project to benefit from the recent extension of the BC Hydro electricity grid into the heart of the 'Golden Triangle' of northwest BC. Developed by Imperial Metals in partnership with the Tahltan Nation, the mine began full operation in 2015 with 301.6 million tonnes of open pit reserves grading 0.36% copper and 0.27 g/t gold. The planned mine life is 28 years at a mill capacity of 30 000 t per day. Concentrate is trucked to the port of Stewart and shipped to smelters overseas. Higher grade copper-gold resources have been delineated below the designed pit and are targeted for extraction by block cave methods.

Red Chris is well situated 80 km south of Dease Lake and 18 km south of Iskut, on a plateau 20 km by road from Highway 37. The deposit is hosted by late Triassic Red stock consisting of leucodiorite, quartz monzonite and monzonite porphyry rocks. Quartz veins with chalcopyrite and bornite are concentrated around an apex of 205 Ma quartz monzonite porphyry, the second of four intrusive phases. The deposit was discovered by prospectors in the 1950s and explored intermittently during the following decades, although its size and economic potential were not fully realized until Imperial Metals acquired the property in 2007. Drilling to 1000–1500 m depth showed that historic drilling (approximately 400 m deep) was largely confined to the sericitized, pyritic cap of the hydrothermal system and that copper sulphides are concentrated in the potassic-altered core, 500 to 1000 m below surface. The study of intrusive phases, structure and alteration has revealed the principal ore controls and provides a template for deposit modelling at Red Chris as well as possible insights for other high-potassium calcalkalic porphyry systems in the region.

New Afton: An Overview of a Successful BC Block Cave

Nimmi Dhadwal, Mine Geologist, New Gold; Josh Parsons, Mine EIT, New Gold

TIME: 11:30 AM – 12:00 PM

New Afton mine is situated in the Quesnel island-arc terrane, and the deposit is classified as a copper-gold, alkalic porphyry system. The porphyry is a Triassic monzonite stock associated with the Iron Mask batholith. Pre-mineral country rocks consist of intermediate to mafic volcanic rocks belonging to the Triassic Nicola Formation. Regional-scale fault zones act as the principal controls to the emplacement of the batholithic rocks and related porphyry-style mineralization in the area. The bulk of the New Afton deposit occurs as a tabular, nearly vertical, southwest-plunging body measuring at least 1.4 km along strike by approximately 100 m wide, with a downplunge extent of more than 1.5 km. The deposit remains open to the west and at depth.

The mine is a 15,000 tpd block caving operation located 8 km west of the city of Kamloops, British Columbia. New Afton has a reserve of approximately 55 million tonnes, with 1.1 million ounces of gold and 940 million pounds of copper. New Afton mine is constructed below the historic Afton open pit mine, operated by Afton Operating Corp. from 1977 to 1997. New Gold began construction and development of the New Afton block cave mine in 2007, and reached commercial production in August 2013 after having blasted its first undercut in June 2011 and the first draw-bell in September 2011. New Afton's Lift 1 is now nearing successful depletion and additional block caving lifts (the B3- and C-zone caves) are being evaluated at greater depths.

TUESDAY PM COMMODITIES AND FINANCIAL MARKETS

TIME: 1:15 PM – 4:00 PM

SPONSORED BY: Goldcorp Inc.

SESSION CHAIRS: Dale Mah, Endeavour Silver Corp; Chris Haubrich, National Bank Financial

This year's session brings together a roster of industry experts including corporate advisory consultants, technical study directors, equity research analysts, and commodity strategists to share their expertise on a wide range of financial and commodity-related matters. Presentation themes will include capital raising and business risks in today's markets as well as commodity-specific discussions on the outlook for gold, silver, copper, and battery metals. With a total of seven high-profile speakers, this session promises to be relevant, to-the-point, thought-provoking and a highlight of Roundup 2019 for all attendees.

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Battery Minerals: The Hype, the Reality and Uncertainty

John Pfahl, Corporate Advisory Consultant and Practice Leader, SRK Consulting

TIME: 1:20 PM – 1:45 PM

Battery minerals are the current commodity darlings of the mining industry. The hype regarding predicted demand (and associated pricing) reached new heights in 2017 and 2018, largely driven by the nascent electric vehicle market and the expectation that electric vehicles, powered by lithium ion batteries, will replace the existing hydrocarbon-based transportation market. Based on these expectations, developers are now constructing new mines around the world, and further investment is flooding into early-stage exploration and development projects.

How real are these estimates of future demand and is the hype justified? This presentation evaluates potential demand scenarios for lithium ion batteries, including the potential impact of electric vehicles. It will cover the key commodities that are used in these batteries, with a focus on lithium and cobalt, and implications for future demand, supply and prices.

Top 10 Business Risks Facing Mining and Metals in 2019-20

Paul Mitchell, Global Mining & Metals Advisory Leader, EY; Lee Downham, Global Mining & Metals Transaction Advisory Leader, EY; Andrew Van Dinter, Global Mining & Metals Tax Leader, EY; and Miguel Zweig, Global Mining & Metals Leader, EY, Iain Thompson, Canadian Mining & Metals Advisory Leader

TIME: 1:45 PM – 2:05 PM

The EY Top 10 Business Risks Facing Mining and Metals in 2019–2020 report is based on an EY survey of more than 250 leading global mining and metals companies and analysis of the operating environment for companies in the sector. This is EY's 11th annual report analyzing and ranking the top strategic business risks for companies in the sector. Underlying business risks for mining and metals companies do not vary significantly from year to year, but the acuteness of the issues and their priorities can change. Although the report does not provide an exhaustive list of the risks facing companies in the sector, it does provide a snapshot of the most significant challenges today. Mining and metals companies that best understand the risk scenarios and potential impacts on their business are better positioned to manage these risks and seize strategic opportunities.

The themes of license to operation and disruption run through this year's risks because mining and metals companies have to deal with many new and variable factors, including societal expectations, digital transformation and unique challenges to portfolio and capital investment decisions.

What can organizations do to protect themselves against the challenges of keeping their license to operate, improving productivity and dealing with trends toward nationalism? They must use capital and collaboration to their advantage as they transform and protect themselves from disruption.

Investment Themes in Metals and Mining for 2019

David Stein, Founder & Managing Partner, Aerecura Capital Corp

TIME: 2:05 PM - 2:25PM

The outlook for the metal and mining sector in 2019 is examined from a deep-value investment approach and a number of themes are touched on at a high level. The macro-economic environment and recent performance of the broader stock markets suggest vastly increased systemic risk as we begin 2019.

The recent market past is reviewed to provide context for how the metals and mining sector has been affected by competing investment themes and what we might expect in the future as these themes evolve. Among the themes that will be discussed are recent market bubbles that have diverted risk capital (including cryptocurrency and cannabis); the mega-cap equities bull market, which has delivered hard-to-beat risk-adjusted returns; and the emergence of passive equity capital management as a dominant market force.

Finally, sector-specific themes will be touched on, including metal/commodity selection and Merger & Acquisition trends.

Copper: Can Exploration Keep Pace with Demand?

Mark Ferguson, Associate Director, S&P Global Market Intelligence

TIME: 2:25 PM – 2:50 PM

With robust copper demand stemming from global economic growth, it is unsurprising that interest in copper supply has been rising. Growth of refined copper use is expected to hit 3.5% in 2019, while the output of global copper mined is expected to grow only modestly, year over year, by about 1%. This imbalance in supply and demand will benefit copper miners because treatment and refining charges will be under increasing pressure, which will reduce some of their operating costs.

Spurred on by firmer copper prices through early in 2018 and by concern over a thin project pipeline in the near to medium term, copper-focused exploration budgets and actively drilled projects increased significantly in 2018, each rising by about 22% to 23% compared to 2017. Despite the additional investment in recent years, the identification of new deposits—particularly those of the scale needed to materially impact supply—has been exceedingly weak for much of the past decade, posing a major threat to the industry's ability to meet global demand scenarios in the not too distant future.

Looking for Silver's Silver Lining

Chris Thompson, Mining Analyst, Head of Mining Research, PI Financial

TIME: 2:50 – 3:10 PM

Since the recovery of precious metal (gold and silver) prices in early 2016 from multi-year lows, silver has underperformed gold, a trend that has driven the gold/silver ratio to 26-year highs. Consolidation (merger & acquisition activity) among silver-focused companies, caused by shrinking margins and a lack of new economically attractive discoveries and development opportunities, has also limited attractive investment opportunities in the silver sector.

While the investment case for silver looks dire, we see a slow and steady recovery in the silver price, led by the gold price and supported by improving fundamentals, yielding a renewed, albeit more tempered, appetite for silver-focused investment opportunities that offer potential to yield attractive returns.

In preparation for this, now is a good time to review the main drivers of the silver price, profile examples of silver-focused projects (exploration, development and production) that offer potential to yield attractive returns at current metal prices that we feel investors will gravitate to as the silver price rebounds.

Gold's Battle for Relevance in a World of Crypto, Cannabis and Commodification

Matthew Turner, Commodities Strategist, Macquarie Bank

TIME: 3:10 – 3:30 PM

Gold market analysts talk a lot about the Federal Reserve, equity markets and the dollar. But stepping back, it seems gold's problem is becoming the modern world. Silicon Valley claims it can develop superior monetary alternatives, and equity investors are seeking excitement elsewhere. Jewellers have to compete for consumer dollars with a plethora of other goods. So is gold destined to become just another commodity? No. Successful innovation is happening in the gold industry too, for investors and consumers, and during tough times, especially for institutions with long memories, we see signs the old is still preferred to the new.

Capital Raising Considerations for Juniors in a Rapidly Changing Financing World

Neil Adshead, Director, Cupel Advisory Corp.

TIME: 3:30 PM – 4:00 PM

During the last 15 years, the model for raising funds for early-stage mineral exploration has changed radically due to major structural shifts in many aspects of capital markets, driven in part by technological innovation, taste, cost of capital for issuers, fees for investors, product development and demography. The previously dominant sell-side brokerage and institutional sector fund-buyer relationship has been negatively impacted by the growing financial clout and decision making power of retired baby boomers, advances in the ease at which individuals can trade their own account (greater disclosure, pervasive high-speed Internet to access more data sources, a glut of websites and conferences, relatively inexpensive e-trading, powerful smart phones and abundant useful software), a dislike of paying fees for limited service and/or mediocre fund performance and the huge growth in the number and flavour of passive ETF (exchange-traded fund) products. To improve their chances of success in finding funding, juniors seeking risk capital today need to be aware of how the financing environment has changed and consider how it will continue to evolve in the near to medium term if they are to source the capital required to deliver the next big discovery; that is, one that will be the most likely to succeed will “skate to where the puck is going, not where it has been”.

WEDNESDAY AM PRECIOUS METALS

TIME: 9:00 AM – 12:00 PM

SPONSORED BY: Endeavour Silver Corp.

SESSION CHAIRS: Albert Chong, Wheaton Precious Metals; Andy Randell, SGDS Hive

The Precious Metals Session will showcase selected gold and silver exploration projects from across Canada and the world. The presentations will feature skilled mineral explorationists highlighting their recent successes based upon the elements of research, innovation, technical expertise and creative project management. The session will provide insights on a range of mineral deposits including mesothermal gold in Eastern Canada, porphyry and epithermal gold and silver in the Americas and Mongolia.

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Geologic Architecture and Precious Metal Mineralization in the Southern Abitibi; New Insights from the Larder Lake Area

Ross Sherlock, Kate Rubingh and the Metal Earth Research Team;
Mineral Exploration Research Centre, Harquail School of Earth Sciences, Laurentian
University, Sudbury Ontario

TIME: 9:05 AM – 9:30 AM

As part of the Metal Earth project, research has focused on an ~40 km long north-south geological transect that is centred over the Cadillac–Larder Lake break and extends northward into the Ben Nevis volcanic complex and to the south over the Lincoln–Nipissing shear zone. The Cadillac–Larder Lake break is a regionally extensive crustal break and hosts a number of gold deposits including the Kerr Addison mine, which historically produced more than 11 million ounces of gold. The Ben Nevis volcanic complex (2696.6 ± 1.3 Ma), part of the Blake River group (2701 ± 3 Ma to 2698.5 ± 2 Ma), is correlative to the Noranda VMS camp but lacks significant metal endowment. The Lincoln–Nipissing shear zone is similar to the Cadillac–Larder Lake break in that it juxtaposes different geological domains and is marked by ultramafic volcanic rocks, clastic sedimentary rocks and a small volume of intrusive rocks from the Timiskaming assemblage and associated gold prospects. At both the Cadillac–Larder Lake break and the Lincoln–Nipissing shear zone, ultramafic rocks of the Larder Lake Group (ca. 2710–2704 Ma; Piché in Quebec) are unconformably overlain by clastic rocks of the Timiskaming (2677–2670 Ma) or Hearst (ca. < 2700 Ma) assemblages. This suggests that the original geological relationship was stratigraphic in nature and subsequently overprinted by deformation and alteration associated with the gold deposits. This is in contrast to previous interpretations that only considered a structural emplacement.

Recent geological and geophysical surveys from the Metal Earth research project indicate that the Cadillac–Larder Lake break is well resolved using seismic methods to depths of more than 30 km and has a corresponding conductivity anomaly. In contrast, the Lincoln–Nipissing shear zone, though it shares similar characteristics to the Cadillac–Larder Lake break, is poorly resolved by seismic and MT methods, perhaps correlating with the relative lack of metal endowment along the shear zone. This is based on MERC–Metal Earth publication number MERC-ME-2018-104.

A Near-Surface, High Grade Gold Discovery - Dixie Project, Red Lake, Ontario

R. Bob Singh, VP Exploration & Director, Great Bear Resources Ltd; Andrea Diakow,
Exploration Manager, Great Bear Resources Ltd.

TIME: 9:30 AM – 9:55 AM

The 100%-owned, 9,500 ha Dixie gold project (Dixie), located 15 km southeast of Red Lake, Ontario, lies near the contact between the Uchi and English geological subprovinces of the western Superior Province.

Gold at Dixie is associated with both silica-sulphide replacement of certain folded lithological contacts and within quartz veins in calc-alkaline basalt. Alteration consists of barren, early, widespread and deformed carbonate-quartz veining, as well as more discrete red-brown biotite–iron-carbonate veining that forms envelopes around the high-grade gold veins. Significant drill intercept results include DL-005: 10.40 m of 16.84 g/t gold within the silica-sulphide alteration zone at the contact between tholeiitic and calc-alkaline basalts, and DHZ-004: 7.0 m of 68.76 g/t gold within quartz veins.

Exploration by various companies began in the 1940s; significant gold was discovered during drilling at the 88-4 zone in 1988. Work continued until 2012 and resulted in many additional discoveries. Great Bear Resources Ltd. began exploration in 2016 with relogging and resurveying of historical drillcore, geological interpretation, 3D modelling and airborne geophysics, and followed up with diamond drilling in 2017. The results of this program led to the identification of large-scale structures controlling gold mineralization that have now been drill tested along a 2.7 km strike length and to a depth of approximately 350 m. The zones remain open in all directions.

The dominantly mafic volcanic sequence has undergone at least three phases of deformation based on interpretation of oriented drillcore, airborne geophysics and limited bedrock exposure. Two major regional-scale D2 fold axes and fold hinges cross the property and are at the focus of current drilling. Regionally, these structures are considered critical features for localizing gold-bearing hydrothermal fluids during peak metamorphic conditions.

Drilling continues at the property with a 30,000 m drill program designed to test the large-scale, predictable, structurally controlled gold system that appears to overprint earlier deformation.

Marathon's Valentine Lake Gold Camp: The Largest Gold Deposit in Eastern Canada

Phillip Walford, CEO and President, Marathon Gold Corporation; and Sherry Dunsworth, Senior Vice President, Marathon Gold Corporation

TIME: 9:55 AM – 10:20 AM

Marathon Gold Corporation's (Marathon) 100%-owned Valentine Lake gold camp hosts the largest gold deposit in eastern Canada with a current global resource of 2,691,400 ounces of gold at 1.85 g/t (measured and indicated) and 1,531,600 ounces gold at 1.77 g/t (inferred). The resource is contained in four near-surface, mainly pit-shell-constrained gold deposits that are open along strike and to depth. The deposits, as well as numerous other gold showings within the property, occur proximal to a major deep crustal structure called the Valentine Lake shear zone (VLSZ). The VLSZ has been traced for at least 18 km at the camp and juxtaposes Precambrian granitoids of the Valentine Lake Intrusive Suite against the Silurian Rogerson Lake conglomerate. The gold occurs in dominantly shallow-dipping, en echelon-stacked, quartz-tourmaline-pyrite veins of variable thicknesses that intrude the Precambrian granitoids and, to a lesser extent, the Silurian conglomerate.

Marathon's understanding of the depositional model for these classic, structurally controlled, orogenic-style gold deposits, hosted within a northeast-striking greenstone belt, has led to repeated successful discoveries of new blind gold deposits and showings over the entire strike length of the Valentine Lake gold camp. Detailed prospecting and trenching have contributed greatly to the exploration success, whereas various geophysical and geochemical methods have had mixed success in identifying gold mineralization. The success of Marathon at the Valentine Lake gold camp has sparked a rejuvenation of regional exploration by numerous other junior companies along the VLSZ where it is traced for more than 400 km through the island of Newfoundland.

Marathon's revised PEA released in October 2018 demonstrates an open-pit production profile of more than 225,000 ounces of gold per year over a mine life of greater than 12 years. The company is focused on advancing the Valentine Lake gold camp toward a prefeasibility study and on discovering new resources with ongoing exploration and infill drilling up to 1,000 m deep at the Valentine Lake gold camp.

The Khundii Gold District: Developing a New Gold District in Southwest Mongolia

Michael MacDonald, VP Exploration, Erdene Resource Development; Mike Gillis, VP Operations for Mongolia, Erdene Resource Development; Peter Akerley, President and CEO, Erdene Resource Development

TIME: 10:20 AM – 10:45 AM

Erdene Resource Development (TSX:ERD) has been an active precious metals exploration company in Mongolia for over a decade, focused on the eastern extension of the Central Asian orogenic belt running through the southern part of the country, and hosting some of the world's largest gold deposits, including Rio Tinto's 60 million ounce Oyu Tolgoi gold-copper deposit.

Erdene's systematic regional reconnaissance exploration programs in this region have resulted in the discovery of multiple gold and copper prospects, including two high-grade, near-surface, Paleozoic, epithermal gold deposits that are being considered for development—Bayan Khundii and Altan Nar—which are located 16 km apart. Drill intersections from 2018 include one intercept of 158 g/t gold over 14 m at Bayan Khundii.

In September 2018, Erdene reported a maiden resource estimate for the Khundii gold project (Bayan Khundii and Altan Nar) consisting of a measured and indicated resource of 751 000 ounces gold grading 2.3 g/t and an inferred resource of 291 000 ounces gold at 1.8 g/t, using a 0.7 g/t gold cut-off grade. At a higher cut-off grade of 1.4 g/t gold, the Khundii gold project contains a measured and indicated resource of 642 000 ounces at 3.7 g/t and an inferred resource of 250 000 ounces at 2.3 g/t.

Erdene has commenced a preliminary economic assessment for the Khundii gold project, with delivery anticipated in January 2019.

While focused on development of the Khundii gold project, Erdene continues to explore the broader district, now known to host the full spectrum of arc-related base- and precious-metal systems, including copper-molybdenum porphyry systems, intermediate sulphidation/carbonate base-metal gold deposits and low sulphidation epithermal gold and gold-silver systems, within an approximately 40 by 60 km area. Exploration of the district remains in the early stages; however, results to date demonstrate the high potential for additional discoveries.

Las Chispas Project — A Developing High-Grade Silver-Gold Discovery in Sonora, Mexico

N. Eric Fier, CEO & Director, SilverCrest Metals Inc.

TIME: 10:45 AM – 11:10 AM

Las Chispas project is the site of historical precious-metal production from narrow high-grade veins in numerous underground mines dating back to approximately 1640. The bulk of historical mining occurred between 1880 and 1930. In 1910, annual production for the three years previous ranged between 3064 and 3540 t grading an estimated 61 g/t gold and 5930 g/t silver.

Access to the project is excellent. A 10 km dirt road connects to a paved highway with Hermosillo, Mexico, 220 km to the southwest; Cananea, Mexico, 150 km to the north; or Tucson, Arizona, United States, 350 km to the northwest. Nearby communities service the Las Chispas project, the Santa Elena mine (originally discovered and operated by SilverCrest) now operated by First Majestic Silver, and the Mercedes mine operated by Premier Gold.

The mineral deposits are classified as low-intermediate sulphidation epithermal veins, stockwork and breccia zones, where silver mineralization is present as primary minerals argentite/acanthite and secondary minerals stephanite, polybasite and pyrargyrite. Gold is related to silver sulphides in addition to an electrum phase. The deposits have been emplaced in a felsic to more mafic volcanoclastic sequence associated with volcanism of the upper portion of the Lower Volcanic Series, which hosts similar deposits in the Sonora and Chihuahua states of Mexico.

Before SilverCrest acquired the project in 2015, no drilling had been completed on the mineralized trend. Since starting in early 2016 to September 2018, SilverCrest has completed phase I, II and partial phase III drill programs totaling 82 809 m in 305 core holes, achieving an updated (post- maiden) resource in September 2018 of 4.3 million tonnes grading 3.68 g/t gold and 347.0 g/t silver for 86.7 million ounces gold equivalent (ratio = 75 [silver]: 1 [gold] using US\$18.50 [about C\$24.97] per ounce silver and US\$1225 [about C\$1653] per ounce gold and metallurgical recoveries of 98% gold and 86% silver).

Cerro Blanco: Developing Central America's Next High-Grade Gold Mine

David Cass, Vice President of Exploration, Bluestone Resources Inc.

TIME: 11:10 AM – 11:35 AM

Cerro Blanco is a classic hot-springs-related, low-sulphidation gold and silver deposit located in southern Guatemala. The project is permitted for a high-grade underground mining operation, with more than US\$200 million (about C\$267 million) previously invested prior to its acquisition by Bluestone in 2017. Infrastructure includes more than 3 km of underground development, the adjacent Mita geothermal project, a water treatment facility, warehouses and a mine fleet. A PEA completed in the first quarter of 2017 highlighted a robust project with first quartile all-in sustaining cash costs and high internal rate of return.

In late 2017, Bluestone initiated geological studies as part of its feasibility study. The work included updating the geological model and guiding a 13 000 m underground and surface drill program that expanded and upgraded the resource and highlighted significant opportunities to add additional ounces.

The current high-grade resource at Cerro Blanco stands at 1.2 million ounces of gold grading 10.1 g/t in measured and indicated categories and 0.36 million ounces gold inferred. Bonanza gold and silver grades are typically associated with ginguero banding and lattice blade (boiling) textures. Bluestone's drilling demonstrates significant mineralized widths where vein arrays converge at depth into basal feeder zones (e.g., hole UGCB18-92: 21.4 m grading 10 g/t gold and 35 g/t silver). In addition to the high-grade resource estimate, a bulk tonnage resource estimate was completed that includes the high-grade veins, vein halos and low-grade disseminated mineralization that occur within overlying conglomerates. The measured and indicated portion of the estimate is 61 million tonnes grading 1.5 g/t gold with 2.99 million ounces of contained gold.

This presentation will review the work undertaken by Bluestone including the current understanding of the geology, geochemistry and distribution of high-grade veins and near-surface disseminated mineralization, where outcropping sinter horizons indicate complete preservation of the hydrothermal system. Cerro Blanco shows many features in common with other shallowly eroded, low- and intermediate-sulphidation deposits, such as Fruta del Norte in Ecuador and Ivanhoe in Nevada, United States.

Unraveling the Geological Model using XRF Multi-Element Geochemistry at the Birimian-Age Bomboré Gold Deposit, Burkina Faso

Pascal F. Marquis, Senior Vice President Exploration, Orezone Gold Corporation

TIME: 11:35 AM – 11:55 AM

Orezone Gold Corporation is currently developing the Bomboré gold project in Burkina Faso, West Africa. The deposit has measured and indicated gold resources of 4.77 million ounces within free-digging oxides and underlying hard-rock sulphides, separated by a layer of partially oxidized transition material.

The top portion of the Birimian basement is weathered to an average vertical depth of about 45 m, but weathering can be as deep as 105 m in places, depending on the local geology and the distance from the current or paleodrainage. Weathering obscures the Birimian geology, which can be particularly complex in areas that are most prospective for gold deposits, where brittle-ductile deformation, folding and intrusive and metasomatic events are superimposed on the metasedimentary lithostratigraphic units.

Portable XRF analyzers were used in benchtop-mode-controlled conditions at Bomboré to acquire nondestructive analyses of elements that have proved to be very useful to model the post-Birimian overburden units, the Birimian metasedimentary and intrusive units, the gold-bearing metasomatized domains and the weathering subunits. These models can be consolidated to build a robust geometallurgical model for the project.

Calcium-, strontium- and scandium-bearing minerals seem to be the most sensitive to the weathering process. These elements, in conjunction with other information such as the specific gravity of core samples and the penetration rate of destructive reverse circulation boreholes, have been used to define the base of the zone for complete oxidation and the base of the weathering zone.

Weathering and grade are the most important economic drivers in the weathered portion of the deposit, where current reserves of 1.15 million ounces of free-digging oxides are hosted. Weathering impacts the geotechnical conditions (pit slopes), mining costs (method, productivity, wear and tear) and processing costs (processing flow sheet, work index, wear and tear, reagent consumption) as well as the metallurgical recoveries.

WEDNESDAY PM BASE METALS

TIME: 1:15 PM – 4:00 PM

SESSION CHAIR: Tony Scott, Macquarie; Ross Gordon, Teck Resources Limited

It has been a volatile year for Base Metals, with some significant changes in sentiment throughout the year. Despite this, the exploration end of the Base Metals business is seeing renewed and innovative activity driven by acceptance that metals like Copper and Nickel are critical to the long term trend towards Electric Cars, Renewable Energy and Battery Storage.

In this session we aim to present new Copper, Nickel and Zinc exploration projects from Canada and around the world.

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El Domo — Part of a Strong Future for Mining and Exploration in Ecuador

Jason Dunning, Adventus Zinc Corporation; Christian Paramo and Marco Perez, of Salazar Resources Ltd.

TIME: 1:20 PM – 1:45 PM

The El Domo copper-gold-zinc VMS deposit is the core asset of the 22 000 ha Curipamba project located off the Pan American Highway in west-central Ecuador, about 2.5 hours northeast of the port city of Guayaquil. The project is being actively explored by Adventus Zinc Corporation (75%) and Salazar Resources Ltd. (25%).

Volcanogenic massive sulphide mineralization at Curipamba project formed within the Paleocene–Eocene submarine volcanic arc of the Macuchi Formation. Evidence suggests that sulphide mineralization is replacing the volcanic hostrocks below the seafloor. The footwall is a felsic dome complex and the hangingwall is a mafic succession. Sub-seafloor replacement is highlighted due to the extensive presence of massive sulphide clasts throughout the massive sulphide unit, which appear completely healed by a massive sulphide matrix. These textures are indicative of a dynamic evolving volcanic complex preserving the VMS system through burial and continued hydrothermal replacement.

The massive sulphide mineralization displays strong zonation from a pyrite core through to a thick copper-rich zone that gradually becomes zinc-rich toward its top and lateral margins. In the footwall there is an irregular but extensive low-grade stockwork zone that also has extensive gypsum-alteration anhydrite. The hangingwall rock units exhibit only limited hydrothermal alteration.

El Domo contains an indicated mineral resource totaling 8.8 million tonnes grading 1.62% copper, 2.34 g/t gold, 2.42% zinc, 48.0 g/t silver and 0.27% lead. The inferred mineral resource totals 2.6 million tonnes grading 1.29% copper, 1.09 g/t gold, 1.51% zinc, 29.0 g/t silver and 0.14% lead (see January 31, 2018, news release). The NI 43-101 technical report was authored by Dr. Lars Weiershäuser, P.Geo., of RPA, an independent qualified person as defined by NI 43-101.

Geology of the Manto Negro ‘Red Bed’ Copper-Silver Project, Mexico

Michael McPhie, President and CEO, Prize Mining Corporation

TIME: 1:45 PM – 2:10 PM

Exploration at Prize Mining’s 100%-owned Manto Negro project in Coahuila State, Mexico, is targeting a sediment-hosted, stratabound copper deposit. The geological setting, style of mineralization, copper-silver grades and thickness of the mineralized horizon are analogous to the world-class Kupferschiefer deposits of Poland and Germany.

Copper-silver mineralization at Manto Negro lies at or near the contact between clastic and overlying carbonate sedimentary rocks of lower Cretaceous age. The sandstone is commonly hematized, giving rise to the term ‘red beds’. Overlying carbonate rocks are massive to laminated limestones, and a thin layer of carbonaceous sedimentary rocks often occurs at the contact. All three rock types can be mineralized. Evaporitic sequences are present regionally, although none have been observed on the property to date.

The stratigraphy lies within the Mexican fold and thrust belt and has been subjected to later basin and range extensional tectonics, so that it has been folded into an anticline and subsequently pulled apart. The centre of the fold has collapsed, leaving steep-sided ridges where copper-silver mineralization is exposed. Of importance for the genetic model is that the project lies near the inner boundary of the San Marcos basin, thought to be an intercratonic sub-basin. The edge of the basin is marked by the San Marcos fault, potentially a growth fault that helped define the structural evolution of the basin and potentially provided channelways for mineralizing fluids.

Observations to date support a late diagenetic model of mineralization whereby metal-rich basinal brines have precipitated copper and silver close to a redox boundary defined by the sandstone-argillite-limestone transition. Mineralization can be either stratabound or transgressive across lithological boundaries, with thicknesses varying from 1 m to more than 15 m and averaging about 4 m.

The widespread nature of copper-silver occurrences on the 17,965 ha property underscores the district-scale potential of the mineralization. The Company is in process of completing the first phase of a 3,000 meter diamond drill program at the site focused on the El Granizo and historic Pilar Grande Mine areas of the property. Initial results from this work will be discussed.

The Harvest and Adyabo Projects in the Arabian Nubian Shield of Northern Ethiopia

Jeff Heidema, Vice President Exploration, East Africa Metals

TIME: 2:10 PM – 2:35 PM

The Harvest and Adyabo projects are located in the southwestern section of the Neoproterozoic Arabian Nubian Shield of Ethiopia. This section of the shield is composed of north-northeast-trending structural blocks that in the project area include predominantly greenschist-facies metavolcanic and metasedimentary assemblages. With deposits such as Bisha (VMS), Hassai (VMS) and Sukari (gold) present in this region of the shield, the favourable implied base- and precious-metal prospectivity, combined with rapidly improving infrastructure in Ethiopia, create a strong incentive for exploration.

Requirements at Harvest and Adyabo mandated the completion of exploration work and resource definition within six- and five-year periods, respectively, in order to retain the ground and move forward to mine licencing. Gold, copper, silver, +/- zinc resources have now been delineated at each project. Both projects initially presented with a large number of surficial targets needing qualification, prioritization and a mechanism for rapid review. Through systematic assessment using geology, geochemistry and geophysics, model-driven key target areas were identified and advanced. The cost/time-effective use of tools such as field Niton pXRF soil sampling aided greatly in advancing work by creating a vast spatial dataset for vectoring to mineralization, target generation and target qualification. Successive exploration campaigns helped establish that prospective precious-metal-rich VMS and orogenic gold target areas were present for further on-ground assessment, and led to eventual resource delineation at both projects.

Continued prospectivity remains because only core footprint resources have been drilled out. East Africa Metals (EAM) now has one mining licence for the Terakimti oxide deposit at Harvest and has submitted two additional mining licence applications for the Mato Bula and Da Tambuk deposits at Adyabo. In mid-2018, EAM received positive PEA results for all three deposits.

Zoned Porphyry-Related Skarn and CRD Mineralization of the Sunnyside-Taylor Complex, Arizona

Rick Trotman and Carl Schnell, of Barksdale Capital Corp; Peter Megaw, IMDEX Inc.

TIME: 2:45 PM – 3:10 PM

Barksdale Capital Corp. is applying modern understanding of porphyry-related carbonate replacement deposits (CRDs) to the exploration of the highly fertile, but only partially explored, Sunnyside Porphyry-Taylor deposit complex in southern Arizona, United States. Grossly, the geology consists of a thick (> 1.5 km) section of Paleozoic sedimentary rocks that were complexly thrust faulted during the Lower Jurassic, then eroded and overlain by volcanic rocks in the Upper Jurassic and subsequently intruded by the Sunnyside porphyry complex, which is part of the Laramide orogeny (65–55 Ma). A classically zoned series of continuous hypogene hydrothermal mineralization styles extends 3.5 km along a well-defined, northwest-southeast-trending structural zone from Sunnyside intrusion-hosted copper-molybdenum-silver mineralization, through a copper-zinc-silver skarn cut in historic drilling, through the copper-zinc-lead-silver CRD comprising South32's Taylor manto deposit, to the outcropping Hardshell silver-lead-manganese oxide deposit.

Comparison with other carbonate-hosted, porphyry-related systems suggests it is unlikely that there is only one peripheral skarn-CRD zone related to the porphyry complex. This suggests that excellent exploration potential exists around the remaining circumference of the Sunnyside porphyry complex, where numerous copper-lead-zinc-silver sulfide veins occur hosted in the Jurassic volcanic rocks. These may represent leakage from CRD mineralization trapped in the underlying Paleozoic sedimentary rocks. The important Taylor deposit occurs in the relatively limestone-poor upper part of the Paleozoic sequence but regionally, it is the deeper, carbonate-dominant part of this sedimentary sequence that hosts the largest porphyry-related CRDs in Arizona (i.e., Magma, Bisbee and Morenci); a fault slice of these deeper units crops out just 1.5 km south of the Taylor deposit and strikes toward the Sunnyside complex. Combining the field data with a modern CRD understanding suggests that multiple zones of strong skarn and CRD mineralization may surround the porphyry complex in highly favourable hostrocks lying at much shallower depths than seen elsewhere in the system. Field mapping, metal ratio studies and geophysical surveys are currently underway to generate drilling targets.

Exploring for Sediment-Hosted Stratiform Copper Mineralization in the Grenville Geological Province

TIME: 3:10 PM – 3:35 PM

Kiril Mugerman, President & CEO, Kintavar Exploration Inc.

Sediment-hosted stratiform copper mineralization (SCC) has been an important source of copper mining but this type of mineralization has never been identified in the Mesoproterozoic (~ 1.2 Ga) marble basins in the Grenville geological province in Quebec, Canada. Previous exploration activity in the area from the 1970s has associated the mineralization with traditional skarn-type systems, but the presence of better infrastructure has allowed for more detailed surface work that was able to demonstrate otherwise.

The copper-bearing marbles are siliceous dolomites metamorphosed to amphibolite facies as indicated by olivine and by diopside paragenesis. The stratiform copper levels show at least three phases of Grenvillian folding. Two copper facies are distinguished: a) very finely disseminated chalcocite in a serpentinized olivine marble and phlogopite, and b) coarser composite chalcopyrite-bornite grains in diopside-phlogopite rocks ranging from marble to feldspar-diopside rocks. In the region, end of the Rigolet orogeny, at 0.95 Ga, is accompanied by the Lesueur alkaline intrusion and sodic-calcic hydrothermal activities associated with extensional faults. Chalcopyrite and bornite are sometimes observed with remobilization in post-orogenic scapolite and infill cavities.

The particular folding observed in the area contributes to the presence of mineralization on the surface and the provision of structural thickening that could make the mineralization amenable to open-pit mining.

The project, which covers more than 100 km², is located in the southern portion of Quebec, just north of Mont Laurier in the Upper Gatineau region, an approximately 4-to-5-hour drive from Montréal. The project is situated in an active forestry region, which contributed to the development of local infrastructure such as roads, camps and power.

So far, the mineralization has been identified in three distinct corridors located approximately 5 to 7 km apart and each represents up to 10 km of favourable stratigraphy on surface. Approximately 10,000 m of drilling has been completed during the past 12 months.

Geology and Mineralization of the Aguilas Project, Southwest Spain.

TIME: 3:20 PM – 4:00 PM

Tim Moody, CEO and Jim Royall, VP Exploration, of Pan Global Resources Inc.

Exploration by Pan Global Resources at its Aguilas Project in Spain is targeting high-level IOCG-style copper and lead-zinc-silver in major faults in the Los Pedroches batholith. Although Spain has a long history of mining and exploration for lead-silver vein-type mineralization, exploration for hematite-dominant IOCG-style copper is a relatively new concept.

The ca. 308 to 314 Ma Hercynian, Pedroches Batholith is a composite granitic-granodioritic body up to 30 km wide and extending west-northwest–east-southeast for approximately 250 km. An acid to basic dike complex follows the axis of the batholith. The batholith intrudes folded Paleozoic metasediments along a deep structural zone near the boundary of the Central Iberia and Ossa Morena zones. The igneous rocks have crustal and mantle chemistries.

Age dates for clay minerals in and adjacent to the Pedroches batholith show multiple hydrothermal events from 285–119 Ma. The main event is during the Triassic, from 230 to 210 Ma, coincident with the breakup of Pangea. Age dates for clays associated with lead-silver are mainly 225–210 Ma; the only available date for a copper deposit in the batholith is ca. 211 ±2 Ma.

The geological setting in the Pedroches batholith is favourable for IOCG-style copper, including numerous copper occurrences, deep fault architecture, repeated periods of extension/transensional tectonism coinciding with emplacement of the batholith, hydrothermal activity and high heat flow.

Exploration in the Aguilas project has identified copper in northeast-trending faults associated with multi-stage breccias and strong hematite alteration. A broad zone of sericite alteration with increasing hematite and fracturing/veins surrounds the breccia. The alteration and style of mineralization share features in common with other hematite-dominant IOCG ore deposits, such as the Olympic Dam in Australia. In contrast, the west-northwest–trending Zumajo structure hosts lead-zinc-silver in breccia and quartz-carbonate veins and lacks appreciable hematite alteration.

THURSDAY AM BC/YUKON/ALASKA CORDILLERA

TIME: 9:00 AM – 12:00 PM

SPONSORED BY: Macquarie

SESSION CHAIRS: Thomas Branson, Equity Exploration Consultants Ltd; Julia Lane, Atac Resources Ltd.

This session covers a broad region in western North America with a diverse geologic history. With exploration spending on the rise, the focus will be on a selection of exciting and innovative exploration programs across a range of commodities and deposit types in BC, Yukon and Alaska.

PROGRAM

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Stardust: A Modern Exploration at a Historic Carbonate Replacement Deposit in Northern British Columbia

Steve Robertson, President and CEO, Sun Metals Corp.

TIME: 9:00 AM – 9:20 AM

The Stardust project, located in northern British Columbia, has a long history of exploration dating back to its initial discovery in 1944. Hosted in the Cache Creek Terrane directly west of the Pinchi fault, the project consists of a full suite of carbonate-replacement-style mineralization located proximal to the Eocene Glover stock.

Historical exploration traced distal epithermal-style vein mineralization along trend to zinc-lead manto-style mineralization to the Canyon Creek skarn zone, which was discovered within interbedded phyllites and limestones directly east of the Glover stock. This work has left a rich repository of exploration data to build upon.

Review of the historical work and compilation of historical data using modern methods, along with new geochemical and geophysical techniques, have allowed the Sun Metals exploration team to build on the work of past explorers and target new and previously unrecognized areas of potential mineralization. In 2018, Sun Metals conducted an initial exploration program at Stardust, which was composed of an integrated geological, geochemical and geophysical effort to identify “new discovery” and “zone expansion” areas. This work led to the drilling of hole DDH18-SD-421, Sun Metals’ best intersection from the 2018 program, which returned grades of 4.99% copper-equivalent over 100 m within limestone beneath the phyllitic package.

Sun Metals views the result from hole DDH18-SD-421 to be a disruptive discovery for the historical Stardust project. This intersection within the carbonates represents significant potential for expansion at Stardust and has regionally raised the profile of large carbonate-replacement deposits as a more attractive target in British Columbia.

Regional And District-Scale Controls on the Zackly Cu-Au Skarn; The Smoking Gun for a New Porphyry District in Alaska?

Frazer Tabeart, Managing Director, PolarX Limited

TIME: 9:20 AM – 9:40 AM

The Zackly copper-gold skarn deposit is located in the Valdez Creek mining district in the central Alaska Range, approximately 250 km (186 mi) northeast of Anchorage, Alaska, United States. The prospect occurs within a 12 km long west-northwest-trending structural corridor that links the Talkeetna thrust to an arc-normal northwest-trending structural break approximately 200 km long.

The geology of the Zackly prospect is dominated by rocks of the Triassic Nikolai greenstone consisting of a lower unit of submarine pillow basalts and minor sedimentary rocks overlain by subaerial amygdaloidal basalt flows, which are in turn overlain by limestones and shales.

The Zackly limestone consists of a large west-northwest-trending wedge, bounded by structurally modified depositional contacts of coeval andesitic to basaltic volcanic rocks. Post-Triassic intrusions at Zackly consist primarily of Cretaceous quartz-monzonite to diorite composite plutonic rocks. Both exoskarn in limestone/marble and endoskarn in intrusive rocks and volcanic rocks are present.

Multiple phases of copper mineralization and associated skarn alteration are observed, including bornite, chalcocite and covellite plus disseminations and stringers of native copper.

An initial mineralizing event occurred when an approximately 125 Ma diorite intrusion formed marble and weakly mineralized skarns in the adjacent silty limestones and volcanic rocks. A later, stronger mineralization event introduced widespread garnet-bearing skarns containing clots, veins and disseminations of bornite and chalcocite, and zones of massive magnetite-
bornite-chalcocopyrite skarns up to several metres thick. These bodies show progressive replacement of intensely upright folded limey sediments modified by a later penetrative low-angle fracture and pressure solution cleavage related to late thrusting.

The presence of porphyry-style veins, overprinting potassic alteration containing K-feldspar and secondary biotite, and subvertical hydrothermal breccias provide evidence for the possible presence of a blind, proximal porphyritic intrusion. Geophysical and geochemical evidence exists at two locations that may represent such intrusions; these are high-priority targets for exploration drilling.

Exploration Along the Forrest Kerr Fault, Northwest British Columbia

Cornell McDowell, VP Exploration, Aben Resources Ltd; Rohanna Gibson, Project Geologist, Terralogic Exploration on behalf of Aben Resources Ltd.

TIME: 9:40 AM – 10:00 AM

The Forrest Kerr property covers 23 397 ha and straddles the Forrest Kerr fault along its entire 50 km north-south extent. The property has road access to its northern and southern regions via the Galore Creek and Eskay Creek roads, respectively, and is located 20 km from Highway 37. The Forrest Kerr fault is a major deep-seated crustal feature that divides Paleozoic stratigraphy to the west from Mesozoic stratigraphy to the east.

The Forrest Kerr property was consolidated by Aben Resources in 2016 from three existing properties: the RDN, Forgold and Forrest claim groups. The property has had a protracted exploration history beginning in the late 1980s, when high-grade auriferous quartz veins were the main targets of interest. Following the discovery of Eskay Creek, located 16 km southeast of the property, the focus of exploration switched to Eskay-type VMS deposits. At the time of Aben's consolidation of the property, the historical database consisted of 130 drillholes totalling 20 000 m, more than 20 000 soil samples and 2000 rock samples.

Aben has completed 12,500 m of drilling in 45 drillholes during 2017 and 2018. Drilling has been focused on the Boundary zone in the central portion of the property, where mesothermal veins carry polymetallic mineralization with high-grade precious-metal mineralization. Host rock types include mixed volcanic and pyroclastic rocks from the Jurassic Hazelton Group that lie adjacent to rocks from the Triassic Stuhini Group. Mineralization is contained in quartz and quartz-carbonate veins and subordinate brecciated horizons near structures that display both brittle and ductile characteristics. The rocks in the Boundary zone have been quartz-sericite-pyrite-altered with variable later hematite and carbonate alteration.

Preliminary Geology of the South Zone Discovery at the Shovelnose Gold Project, Southwest British Columbia

Peter Fischl, Exploration Manager, Westhaven Ventures Inc.

TIME: 10:00 AM – 10:20 AM

The Shovelnose project covers 15 000 ha of the Spences Bridge Group, composed of mid-Cretaceous felsic and intermediate volcanic rocks situated in a 110 km long northwest-trending belt that is prospective for epithermal gold mineralization. Re-evaluation in 2017 of historical exploration at Shovelnose led to the completion of follow-up ground magnetic surveys and resampling of historical drillcore for clay mineralogy (SWIR spectroscopy) to map zones of hydrothermal upflow, which directly led to the discovery of the South zone.

The South zone has been traced over a strike length of 700 m and a vertical range of 340 m. This vein zone is bisected by a west-northwest-trending structure separating rhyolite lapilli tuff to the north from rhyolite to the south. Veining in the tuff ('North block') strikes north-northeast (020–030°) and dips steeply northwest, whereas veining in the rhyolite ('South block') strikes south-southeast (150°) and dips steeply southwest. A basement sequence of andesitic tuff and flows shows minimal vertical displacement across this structure, suggesting the rhyolite tuff is laterally replaced to the south by a rhyolite dome up to 250 m thick.

Vertical zonation of certain epithermal indicators assisted in the vectoring to higher grade mineralization. Strongest gold mineralization occurs in a shallow horizon (1200–1300 m elevation) that features colloform-crustiform-banded quartz veins containing adularia, bladed quartz after calcite, ginguero (black amorphous sulphides) and visible gold. Deeper veining (below 1000 m elevation) features barren massive quartz containing orthoclase.

Multiple phases of veining and brecciation are evident at South zone, beginning with a silica-pyrite-healed hydrothermal breccia. This is veined by brown-grey to black chalcedony, followed by pale-grey banded quartz±adularia±pyrite/marcasite±ginguero. Phase 3 carries significant gold in a shallow horizon in both the North and South blocks.

Spud Huestis Award Presentation: Influences on Mineral Deposition and Exploration; Keno Hill Silver District, Yukon

Seymour Iles, Exploration Manager, Alexco Resource Corp.

TIME: 10:20 AM – 10:50 AM

The Keno Hill silver mining district is located in the northwestern part of the Selwyn Basin within sedimentary rocks that underwent deformation and metamorphism to lower greenschist facies during the middle Cretaceous. Silver-lead-zinc mineralization, suspected to be 88 Ma, is located within fault-hosted veins situated within the lower member of the Mississippian Keno Hill quartzite, the basal quartzite member.

Three-dimensional modelling of vein-fault surfaces shows that they are highly nonplanar and that wide vein mineralization is located on steeply dipping and more northerly striking fault elements. Understanding the specific cause of acute variations in strike and dip along fault surfaces at Keno Hill has been important in targeting areas for exploration.

At Keno Hill, the nonplanar geometry displayed by the vein faults reflects the fundamental process of their development through the growth of incipient Riedel shear arrays and their subsequent linkage. This process repeats at different scales and is strongly influenced by the mechanical properties of the host stratigraphy. Lithological competency variations, between brittle quartzite and interbedded graphite schist, cause a vein fault to develop as a series of stacked, stratigraphically bound arrays, where array geometries vary in the vertical dimension depending on the thickness and gross strength of the host rocks. Continued deformation eventually necessitates the linkage of arrays to form larger, through-going, composite faults. It is the mechanically heterogeneous stratigraphy at Keno Hill that controls the location and geometry of initial fault segmentation, later linkage, and a resultant highly nonplanar fault surface, which in turn controls the location of dilation, fluid flow and mineralization.

The study resulted in realignment of our exploration strategy at Keno Hill and its successful application to the Bermingham deposit, which currently contains an indicated mineral resource of 33.3 million ounces of contained silver, an additional 10.4 million ounces of inferred silver resource and remains open.

Saddle North Gold-Copper Porphyry: Another Exciting Discovery for GT Gold Corp. in the Golden Triangle of Northwest British Columbia

Charlie Grieg, Vice President of Exploration, GT Gold Corp.

TIME: 10:50 AM – 11:10 AM

The Saddle North (SN) gold-copper-silver discovery lies 10 km from Highway 37 and grid power and less than 20 km west of the Red Chris mine. Ore-grade mineralization was first drilled in 2018 and the news was made public in September 2018 (430 m of 0.67 g/t gold, 0.41% copper and 0.89 g/t silver in hole TTD085).

SN lies 1.5–2 km west of GT Gold Corp.'s Saddle South epithermal gold-silver system, and an arm of the SN system overlaps and lies subparallel with the slightly older Saddle South trend. The two mineralized trends were originally identified by soil geochemistry and are well defined by IP chargeability and/or magnetic anomalies.

A total of 11 holes and 7,473 m have been drilled at SN, outlining a north-northwest-trending, steeply west-southwest-dipping, intrusive-hosted, mineralized system with a strike length of >600 m, a thickness of approximately 600 m and a downdip length of >1200 m. A higher grade core, approximately 350 m thick, comes to surface but is best developed at depth. Mineralization remains open downdip and along strike, and grade increases downdip.

The SN intrusive complex appears to be similar lithologically and temporally to the Red Chris porphyry deposit, but with high-potassium calcalkalic rocks of 206–204 Ma predominating. The host intrusive rocks are composed of fine-grained, equigranular to crowded hornblende feldspar porphyritic (quartz?) monzonite or monzodiorite bodies, locally rich in subround inclusions, strongly altered by potassic (magnetite, potassium feldspar, biotite) or chlorite-sericite-silica±magnetite assemblages. Intrusive rocks appear to be bound on either side and closer to surface by near phyllic alteration zones (quartz-sericite-pyrite) that are most intense but narrower in the footwall, across a bounding fault and more widespread closer to surface. Propylitic alteration (chlorite, epidote, ±pyrite) is mainly developed peripherally, in Upper Triassic fragmental volcanic rocks. Grade is controlled by the abundance and intensity of quartz-magnetite-pyrite-chalcopryrite veins and commonly associated pyrite-chalcopryrite disseminations.

Blue Sky Porphyry: An Exciting New Gold-Rich Porphyry Discovery on the Freegold Mountain Property, Yukon

Tony Barresi, VP Exploration, Triumph Gold Corp.

TIME: 11:10-11:30

At Triumph Gold Corp.'s Freegold Mountain property, the Nucleus epithermal gold and Revenue diatreme-related gold-silver-copper-molybdenum deposits are contained within a 6 km long multi-element soil anomaly. A technical review of the property in 2016 suggested that this anomaly outlines a single large porphyry to epithermal transitional mineralizing system.

Drilling in 2017 tested the hypothesis with broad stepouts away from the resource areas and intersected some of the longest high-grade intervals of porphyry- and epithermal-style mineralization recorded on the property. A high-grade, gold-rich zone intersected in hole RVD17-13 (1.08 g/t gold, 6.6 g/t silver and 0.29% copper over 57 m) represented a 350 m stepout east of the Revenue diatreme.

In 2018, six drillholes intersected the same mineralization, delineating a steeply dipping body of continuous mineralization related to stockwork veining, brecciation and potassic alteration: the Blue Sky porphyry. Within the Blue Sky porphyry, hole RVD18-19 intersected 316 m grading 1.1 g/t gold, 5.0 g/t silver and 0.27% copper, including 79.75 m grading 2.5 g/t gold, 6.9 g/t silver and 0.38% copper, making it the longest > 1% copper-equivalent intersection of porphyry mineralization ever made in Yukon. The Blue Sky porphyry, combined with other well-mineralized bodies, defines a 500 m long corridor of high-grade mineralization that is open along strike and to depth.

Paragenetic and geochronological studies indicate that the mineralization throughout the Revenue–Nucleus–Blue Sky area is approximately 75 Ma but it is hosted in approximately 105 Ma or older rock, suggesting that the causative intrusion and core of the hydrothermal system has not yet been intersected by drilling. In 2019, with the benefit of a new deep-penetrating IP-DC-MT survey, Triumph Gold will conduct deep drilling (> 1000 m) targeting the causative intrusion and hydrothermal core that is responsible for the 6 km long Revenue–Nucleus–Blue Sky mineralized trend.

Geology and Exploration Potential of the Minto Copper Belt, Yukon: Migmatized Porphyry Copper-Gold Deposits

Nikolett Kovacs, Exploration Manager, Pembridge Resources PLC

TIME: 11:30 AM – 11:50 PM

The Minto Copper belt is a 42 km long, northwest-trending corridor of copper-gold mineralization in central Yukon that includes the Minto mine, the Carmacks Copper deposit and several other copper-gold occurrences. It is the only known area in Yukon with deposits of similar age and metal tenor to the prolific Late Triassic to Early Jurassic porphyry copper-gold deposits in British Columbia.

Hypogene copper mineralization is hosted within variably deformed and metamorphosed hostrocks that occur as elongate inliers engulfed in the eastern phase of the Early Jurassic Granite Mountain batholith (GMB), which is part of the Minto plutonic suite (ca. 205–195 Ma). The genesis of the deposits has been controversial because copper mineralization has no obvious link to veins or other hydrothermal features and the origin of the hostrocks, their relationship to the GMB and the genetic relationship between the deposits have been obscured by post-ore modification processes.

Pembridge Resources plc's study of the Carmacks Copper deposit shows that the protolith of mineralized rafts are Upper Triassic (ca. 217 Ma) metavolcanic rocks of Stikinia that were mineralized at ca. 212 Ma ($^{187}\text{Re}/^{187}\text{Os}$ molybdenite) and subsequently partially melted during emplacement of the GMB at ca. 205–195 Ma (approximately 800°C at 5.5–6.5 kbar). The metavolcanic xenoliths were variably migmatized and copper mineralization was remobilized as an immiscible sulphide melt that eventually crystallized in the migmatite as coarse, net-textured bornite and chalcopyrite, coeval with crystallization of the GMB (ca. 198 Ma from $^{187}\text{Re}/^{187}\text{Os}$ molybdenite). The inferred timing of mineralization and metal tenor suggests that Minto and Carmacks Copper deposits were likely Late Triassic copper-gold porphyry deposits similar to those of Stikinia in BC that were subsequently upgraded and modified by tectonic burial, deformation, metamorphism and migmatization during emplacement of the GMB in the Early Jurassic.

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