AME ROUNDUP

Roundup 2022 is hosted on the unceded territories of the Coast Salish people, including the lands belonging to the xwməθkwəy əm (Musqueam), Skwxwú7mesh (Squamish) and səl ílwətaʔɬ (Tsleil-Waututh) Nations.

Abstract Guide

ABSTRACT GUIDE

TECHNICAL SESSIONS

CORE SHACK

Technical Session authors and Core Shack participants as confirmed at the time of printing.

REGIONAL OVERVIEWS

Mineral Exploration and Mining in British Columbia, 2021

Gordon Clarke, Director, Mineral Development Office, British Columbia Ministry of Energy, Mines and Low Carbon Innovation

Regional Overviews
10:10 AM – 10:35 AM

Mineral and coal production for 2021 continued to be a major contributor to the provincial economy, and higher coal prices resulted in the Willow Creek coal mine re-opening. One metal mine (Silvertip, silver-lead-zinc) was expected to restart, but Coeur Mining Inc. is instead assessing the potential for a larger scale expansion due to successful exploration results.

Although mining and exploration continued to successfully adapt to COVID-19, floods late in the year caused disruptions. Nonetheless, exploration activity in British Columbia increased relative to 2020, continuing an upward trend that began in 2019. Commodity prices, particularly for coal, gold and copper remained strong. The value of mining production increased significantly. Acquisitions highlighted the quality of BC projects and the province's attractiveness for investment. For example, Newmont Corporation acquired GT Gold Corp. for approximately C$393 million and now holds the Tatogga project, which includes the Saddle North porphyry copper-gold deposit. Hochschild Mining PLC intends to take over as operator of Skeena Resources Limited's Snip Gold project, spending a potential C$115 million. Newcrest Mining Limited announced its having entered into an agreement to purchase Pretium Resources Inc.'s Brucejack gold mine for approximately C$3.5 billion.

Numerous revised resource estimates were announced, and initial resource results were reported for the Lawyers project (Benchmark Metals Inc.) and Treaty Creek project (80% Tudor Gold Corp., 20% Teuton Resources Corp.). Preliminary economic assessments were announced for the Schaft Creek Cu-Mo-Au-Ag project (75% Teck Resources Limited, 25% Copper Fox Metals Inc.) and the Wicheeda REE project (Defense Metals Corp.). Kutcho Copper Corp. released a feasibility study for their Kutcho copper-zinc project, Artemis Gold Inc. released a feasibility study for their Blackwater Gold project, Newcrest Mining Limited (70%) and Imperial Metals Corp. (30%) released a pre-feasibility study for block cave mining at the Red Chris copper-gold mine, Skeena Resources Limited released a prefeasibility study for their Eskay Creek gold-silver project, and Spanish Mountain Gold Ltd. released a pre-feasibility study for their Spanish Mountain gold-silver project.

Many companies reported excellent results from large drilling programs for both copper and precious metal projects. The potential of deep porphyry targets continues to be highlighted with continued announcements of high-grade intersections. Reports of new discoveries and significant results continue for precious metals, base metals and other commodities, supporting BC's reputation as a premier exploration and mining jurisdiction.

Yukon Geology, Exploration and Mining Overview, 2021

Scott Casselman, Head of Minerals Geology, Yukon Geological Survey

Regional Overviews
10:36 AM – 11:01 AM

Yukon mineral exploration activity in 2021 continued to be affected by the COVID-19 pandemic; however, measures put in place by mining and exploration companies, contractors and suppliers, being supported by the Yukon Government, allowed the 2021 season to approach 'normal'.

Exploration expenditures were up 50% over 2020 and mine development expenditures were up 32%. Hard rock mine production topped out at C$500 million. Yukon Mineral Exploration Program (YMEP) funding for 2021 was C$1.48 million and was distributed to 32 hard rock projects and 20 placer projects.

The Eagle Gold mine of Victoria Gold Corp. continued to ramp up to full production, breaking new records for monthly gold production as they fine-tuned their heap leach operations. At Keno Hill, Alexco Resource Corp. restarted operations at the underground silver veins, initially with production from the Bellekeno deposit, then switching to the Bermingham deposit. The Minto copper-gold-silver mine continued production from underground throughout the year and in November the private company that operated the mine completed a reverse take over followed by a listing on the TSX as Minto Metals Corp.

The Kudz Ze Kayah VMS project of BMC Minerals Ltd. and Coffee project of Newmont Corporation are working their way through the environmental screening process, which in Yukon is managed by the Yukon Environmental and Socio-economic Assessment Board (YESAB).

The number of active exploration projects dropped slightly, from 106 in 2020 to 91 projects in 2021. Gold continues to be the most sought-after commodity, with 59% of the projects targeting the precious metal, followed by copper (15%), lead-zinc (8%), silver (16%), nickel–PGEs (1%) and tin and others (1%).

The Mayo–Keno–Clear Creek area was the most active area for exploration and mining in 2021. The area hosted 29% of the active exploration projects, representing 65% of exploration and development spending. The Dawson region was the second busiest area for active projects, but represented only 4% of exploration expenditures. The Dawson Range porphyry belt had 16% of the active projects, representing 20% of expenditures.

The Yukon Geological Survey (YGS) is focused on supporting the exploration and mining community. The YGS has been busy compiling exploration data as well as providing the regional geological framework to allow companies continued exploration success. Due to the recent global focus on critical minerals, the YGS initiated a study on the Canadian list of critical minerals in Yukon and, in November, published the *Yukon Critical Minerals Inventory 2021*.

ABSTRACT GUIDE

Alaska's Mineral Industry Activity in 2021

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

Regional Overviews
11:02 AM – 11:27 AM

Alaska's diverse metallogenic provinces, under-explored mineral resource potential and world-class gold, copper, lead, zinc and coal deposits, continue to attract exploration capital. Alaska's estimated total 2021 exploration spending, including near-mine, development-stage and exploration projects, is at least US$212 million (about C$271 million), up significantly from 2020. At least 21 non-mine projects each spent more than US$1 million (about C$1.3 million). In 2021, Alaska had 7 lode metal mines (Red Dog, Fort Knox, Gil-Sourdough [new in 2021], Pogo, Kensington, Greens Creek and Dawson), 1 coal mine (Usibelli), and about 200 placer mines. There were 11 advanced-exploration– and development-stage projects (10 active; 6 with drill programs).

In 2021, companies in Alaska had numerous exploration successes and discoveries. The primary focus was on intrusion-related and mesothermal gold exploration and development projects statewide. Alaska's porphyry Cu-Mo-Au (±Re, ±Pd) belt, volcanogenic and sediment-hosted Zn-Pb-Ag-Au-Ag massive sulfide districts and graphite and platinum group minerals were also the focus of exploration interest. Alaska had at least 40 active early-stage exploration projects throughout the state. Drilling programs to advance exploration and development projects were carried out at the Alaska Range (Caribou Dome), Arctic, Donlin, Estelle, Golden Summit, Golden Zone, Goodpaster/Central, Graphite Creek, Healy, Herbert Gold, Illinois Creek, Johnson Tract, Lik, Manh Choh, Niblack, Red Mountain, Round Top, Sam, Shorty Creek, 64 North, Tibbs, Treasure Creek, Unga and Upper Kobuk projects.

The Alaska government encourages resource development by providing geological datasets/maps, airborne geophysical surveys, Alaska Industrial Development and Export Authority partnerships with private entities to finance infrastructure, and permit coordination by the Office of Project Management and Permitting (https://dggs.alaska.gov/minerals/akgeology-info.html).

Introduction to the Pan-Canadian Geoscience Strategy

Adrian S. Hickin, Chief Geologist and Executive Director, BC Geological Survey

New Geoscience
1:33 PM – 1:43 PM

The themes of the 2022 New Geoscience Session are based on the five priority areas of the proposed Pan-Canadian Geoscience Strategy, a federal-provincial-territorial collaboration coordinated through the National Geological Surveys Committee. The Strategy contributes to the Canadian Minerals and Metals Plan and responds to calls from governments and stakeholders to improve public geoscience coordination and funding.

The mineral and energy sectors are significant to the Canadian economy and geoscience plays an essential role in fostering strong mineral and energy investment. Public geoscience produced by government geological survey organizations underpins Canada's competitive advantage in attracting resource exploration and development. The geo-resource value chain extends from land-use planning to exploration and from safe infrastructure development to reclamation; therefore, diverse geoscience is required to support the life cycle of responsible resource development. Public geoscience also contributes to environmental protection and societal well being and can support climate change mitigation and adaptation.

Under this vision, the Pan-Canadian Geoscience Strategy seeks to

- support a globally competitive mineral and energy exploration and development sector in Canada;
- provide accessible geoscience data and knowledge to inform sustainable development and land use decisions;
- reduce environmental and public safety risks associated with resource development and geological hazards and
- be responsive to society's evolving expectations for land and resource management.

Through engagement and consensus, the Strategy identifies five interdependent priority areas for action: 1) advancing framework geoscience; 2) advancing mineral and energy potential modelling; 3) facilitating access to online data; 4) supporting the training of next-generation geoscientists; and 5) enhancing public literacy in geoscience.

Upper Hazelton VMS Systems: New Insights from the Kitsault Area

Rebecca Hunter, Senior Minerals Geologist and Bram van Straaten, Senior Minerals Geologist, Copper, BC Geological Survey

New Geoscience
1:45 PM – 2:03 PM

The Kitsault River area hosts significant silver-rich VMS deposits in late Early to Middle Jurassic volcanosedimentary rocks of the upper Hazelton Group. We studied the lithostratigraphic and structural setting of the mineralization systems through combined field, geochemical and geochronological studies. Unlike VMS systems within the Eskay rift (e.g., Eskay Creek, Anyox), the Kitsault River area does not host extensive rift-related, tholeiitic mafic to bimodal volcanic rocks of the upper Hazelton Group. In contrast, stratabound- to vein-style silver-lead-zinc mineralization at Dolly Varden, Torbrit and North Star is hosted within andesitic-dacitic volcaniclastic to epiclastic rocks that are overlain by calcalkaline basaltic tuff to tuffaceous epiclastic sandstones of the upper Hazelton Group. The lead-zinc-silver-strontium mineralization at the Sault showing resides in a similar overall stratigraphy but is hosted within a locally graphitic and calcareous sedimentary to volcaniclastic rock package. New geochronological results show that the epiclastic sandstones at Sault are less than ca. 188 Ma (detrital zircon age), which may indicate that the Sault showing is slightly older than the Eskay Creek VMS deposit. At the Wolf deposit, a felsic tuffaceous sandstone to argillaceous tuff yielded a crystallization age of ca. 178 Ma, similar to ages for the upper Hazelton Group within the Eskay rift. The presence of slightly older to contemporaneous VMS-type systems outside the main Eskay rift reveals that calcalkaline upper Hazelton Group strata are prospective for VMS– or hybrid VMS-epithermal–style silver-lead-zinc mineralization. Such systems represent potentially overlooked exploration targets within the Golden Triangle.

Early Ordovician Seamounts Preserved in Yukon: Implications for the Rift History of Western Laurentia

Rose Cobbett, Yukon Geological Survey and Memorial University of Newfoundland; Stephen J. Piercey and Luke Beranek, Memorial University of Newfoundland; James L. Crowley, Boise State University

New Geoscience
2:05 PM – 2:23 PM

The breakup of supercontinent Rodinia and development of the western Laurentian margin is recorded by Neoproterozoic to mid-Paleozoic continental margin strata that are partially preserved in Yukon. Constraints for the timing of the breakup include the age of rift-related magmatism, tectonic subsidence analysis and regional unconformities, which together suggest the rift to drift transition occurred at ca. 500 Ma in the northern Canadian Cordillera. Igneous rocks occur sporadically in post-rift lower Paleozoic strata along the length of the Cordillera but their relationship to the evolution of the margin remains enigmatic.

Extensive exposures of mafic volcanic and plutonic rocks of the Menzie Creek Formation are interlayered with Lower Ordovician continental margin strata in central Yukon. The facies and distribution of the Menzie Creek Formation suggests they represent partially preserved seamounts. Zircon collected from two separate samples within the volcanic successions yielded unimodal U-Pb age peaks at ca. 484 Ma, which are interpreted as the age of eruption. Menzie Creek Formation rocks are alkali basalt with ocean island–like chemistry. The trace-element and isotope systematics of these rocks suggest the melt source is the subcontinental lithospheric mantle from a depth between 75 and 100 km.

The Menzie Creek Formation is spatially associated with the Faro deposits and our new U-Pb dates provide further constraints on their age. Latest Cambrian to Early Ordovician magmatism is also documented at the Matt Berry deposit (ca. 486 Ma) near Frances Lake, in the Vampire Formation of southeast Yukon (ca. 486 Ma), and in the Kechika Group of Cassiar Terrane, southwest of the Tintina fault. Together these occurrences suggest that a regional magmatic and metallogenic belt was developed along the continental margin in the latest Cambrian to Early Ordovician.

Data-driven Prospectivity Modelling to Support Critical Mineral Discovery

Christopher Lawley, Michael Gadd, Suzanne Paradis, Jan Peter and Nathan Hayward, Geological Survey of Canada; Anne McCafferty, Garth Graham, Karen Kelley, Poul Emsbo, Joshua Coyan and Carma San Juan, United States Geological Survey; David Huston, Mike Barlow and Karol Czarnota, Geoscience Australia

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New Geoscience
2:25 PM – 2:43 PM

Sedimentary basins and their associated mineral systems represent important sources for the critical raw materials required to transform electrical power grids and transportation industries to renewable energy; however, the complex stratigraphy of the host sedimentary basins, together with the challenge of using geochemistry and geophysics to detect mineralization under cover, present a number of obstacles to the discovery of new mineral deposits. We address those knowledge gaps by integrating public geological, geochemical and geophysical data with plate tectonic reconstructions to generate data-driven prospectivity models across Canada, the United States and Australia. We focus on Mississippi Valley-type (MVT) and clastic-dominated (CD) zinc-lead deposits, which are important sources of zinc, lead, silver, cadmium, gallium, germanium, antimony, and indium. Model results demonstrate that the vast majority of CD and MVT deposits occur within thick sedimentary basins at the edges (or inboard) of cratons, which are interpreted to represent long-lived tectonic settings that favoured the low-temperature fluid transport of metals. Both mineral systems are also associated with long-wavelength magnetic and gravity gradients, which are interpreted to map major crustal boundaries that have influenced the transport of mineralizing fluids from their evaporite and carbonate source rocks to their depositional traps. Prospectivity models were evaluated and ranked after a series of machine learning competitions, with the best results reducing the search space for MVT and CD deposits by more than 95%. Our results highlight how public geoscience geared toward the development of pre-competitive datasets, models and mineral-system concepts can be used to support the mineral exploration industry in its search for new sources of critical raw materials.

Predictive Mapping of the Mineral Potential in British Columbia, Canada

Evan Orovan, Mineral Potential Specialist, BC Geological Survey; Arianne Ford and Katie Peters, Kenex Pty Ltd; Yao Cui, Acting Director, Resource Information, BC Geological Survey

New Geoscience
2:45 PM – 3:03 PM

The British Columbia Geological Survey (BCGS) has initiated a multi-year mineral potential mapping project. The principal aim of the project is to identify areas of high prospectivity for key mineral systems across British Columbia to assist government decision making around land-use planning, while also delivering value-added precompetitive geoscience data for the mineral exploration industry.

The initial phase of the project included a pilot study that focused on method development in collaboration with Kenex Pty Ltd (Kenex). A weights-of-evidence method was adopted, which produced data-driven mineral potential maps for a given mineral system. This method allowed for a comprehensive review of outputs at every stage of the modelling process to ensure that the maps were geologically sensible and statistically valid.

The mineral systems modelled in this pilot study were porphyry copper-gold, VMS copper-lead-zinc and magmatic nickel for a given area within BC. The spatial parameters that were tested relied on BCGS and Kenex mineral systems expertise, previously available, high-quality precompetitive data and newly compiled data from assessment reports. The datasets used in the project are all managed by the BCGS and include seamless geology, attributed faults, mineral occurrences (MINFILE), geophysics (gravity and magnetics) and multi-element geochemistry. The quality of the datasets and understanding of the mineral systems allowed for an extensive number of relevant spatial variables to be identified and tested, and for viable mineral potential models to be produced for the three chosen mineral systems. Based on the success of the pilot study, modelling will continue into new areas and include more mineral systems.

Engaging with Geoscience: Connecting Geoscience Literacy and the Evolving Next Generation of Geoscientists in Canada

Sonia Talwar, Director, Geological Survey of Canada

New Geoscience
3:05 PM – 3:23 PM

With a vision to "*provide geoscience information to underpin the responsible development of Canada's geo-resources, and serve the public good"*, the Pan-Canadian Geoscience Strategy (the 'Strategy') recognizes the importance of geoscience understanding that is foundational to responsible land management and resource decisions including geological resource development.

While the Strategy outlines five pillars of focus, this talk highlights two: 1) how public geological surveys frame the emerging challenges for the next generation of geoscientists; and 2) how geoscience literacy can be foundational to responsible resource development. Examples will be provided of 1) how the Geological Survey of Canada (GSC) is training the next generation of geoscientists and 2) how the GSC is building trust in and public awareness of geoscience to support broad societal goals of equity, diversity and inclusion as we chart a pandemic recovery path for Canada at home and through our trade connections internationally.

Examples include a student hiring and mentoring program at the federal level within Natural Resources Canada called Sistering Indigenous and Western Science (SINEWS). SINEWS aims to advance reconciliation and increase representation in geoscience by pairing Indigenous and non-Indigenous women to co-develop and deliver a research project that can braid Western science and Indigenous Knowledge and create opportunities in science, technology, engineering and mathematics. The GSC is an active supporter of this initiative.

The GSC supports the development of best practices for geoscience engagement and building capacity in using geoscience information through partnerships with science outreach organizations and developing plain-language materials about geoscience projects.

The GSC has prioritized maintaining respectful, cooperative and mutually beneficial relationships with Indigenous communities through its geoscience initiatives. To strengthen this work, the GSC has established the Indigenous Relations Network (IRN), an internal community of practice focused on supporting the GSC's capacity to engage meaningfully and respectfully with Indigenous communities on research. The IRN develops tools and builds capacity within the GSC to support these goals.

ABSTRACT GUIDE

COMMODITIES & FINANCIAL MARKETS

Outlook 2022: Growth in a Time after COVID-19

Douglas Porter, Chief Economist and Managing Director, BMO Financial Group

Commodities & Financial Markets
9:05 AM – 9:27 AM

Douglas Porter will discuss the 2022 economic and financial outlook amid the many challenges and geopolitical cross-currents surrounding the global economy. Some key questions that will be addressed:

- What are the prospects for recovery in Canada and the United States, with inflation flaring and COVID-19 lingering?
- Against this backdrop, what are the prospects for interest rates and the Canadian dollar?
- Will supply-chain issues fade, or are we facing a longer lasting inflation episode?
- What are the implications for commodity markets and precious metals in this environment?
- What are some of the potential lasting impacts of the pandemic on the global economy?

Building a Gold Mining Company – What Works, What Doesn't

Ian Telfer, Chairman, Aris Gold Corp.

Commodities & Financial Markets
9:27 AM – 9:49 AM

Abstract not available at time of printing.

Critical Metals for a Sustainable World: Global Decarbonization Drives Demand for Electric Vehicle and Battery Metals

Patricia M. Mohr, Economist & Commodity Market Specialist, Capitalight Research Inc.

Commodities & Financial Markets
9:49 AM – 10:11 AM

Canada can lead in developing a secure and resilient global supply chain for 'critical minerals'—copper, nickel, lithium and rare-earth elements. The goal of 'net-zero carbon' by mid-Century, adopted by many countries, opens up huge business opportunities for Canadian mining, processing and manufacturing companies—from mineral exploration to precursor chemicals to batteries and high-tech services. Recent developments suggest strong commodity prices ahead.

Evolution in Marketing: the Good, the Bad and the Ugly

Kai Hoffmann, CEO, Soar Financial Group

Commodities & Financial Markets
10:11 AM – 10:33 AM

Forget about pickaxe and shovel; a quality mic, headphones and ring light are the mining tools of today!

Mining and marketing are like geologists and beer. Many, many exploration projects would have never made it across the finish line without them.

Marketing fulfills one of the most important roles in an exploration and mining company, yet many CEOs pay it lip service, or worse, get it wrong, leaving the company dead in the water.

Marketing has evolved dramatically in recent months. Investors consume information very differently and information flow has accelerated tremendously.

Join me for an in-depth discussion on the emergence of new marketing formats, changes in investor behaviour and commentary on recent marketing campaigns. I will highlight for you the good, the bad and the ugly.

ABSTRACT GUIDE

Mining Companies Face New Political Risks

George McLeod, Managing Partner, Access Mining

Commodities & Financial Markets
10:33 AM – 10:55 AM

The global mining industry will confront unprecedented political risk brought on by a trifecta of high metals prices, spiralling government deficits, and the global transition from fossil fuels to metals-intensive electricity.

Mining companies saw the initial signs of this over the past year when Peru and Chile—long deemed safe havens—elected left-wing governments that targeted mining companies. More is to come in the next five years and mining companies are ill-prepared for the political challenges.

COVID-19 has left government finances in shambles, causing them to look inward and to question their commitments to international investors. As government finances continue to decline and metals prices rise, minerals may increasingly be viewed as 'national property', and off limits to foreign investors.

Compounding this is the transition by governments from fossil fuels to electricity. This will place additional pressure on base-metal and uranium reserves, which are already declining following years of exploration underinvestment. The transition to electricity may also cause metals to be viewed as energy resources, leading them to take on a geopolitical significance similar to that of oil.

This presentation will discuss the new political and economic environment that mining companies will face. It will review mitigation measures being employed by mining companies and discuss both 'formal' threats such as windfall taxes and expropriation, and informal issues including regulatory harassment and fraud. Drawing on more than 15 years of experience in political and fraud investigations, this talk will also examine ways that mining companies can prepare for the risks ahead.

Can Magnetic and Radiometric Surveys Conducted using Remotely Piloted Aircraft Systems Detect Dispersal Trains in Subglacial Tills?

Travis Ferbey and Easton Elia, BC Geological Survey; Mel Best, Bemex Consulting International; Rob Shives, GamX Inc.; and Brent Ward, Simon Fraser University

Additions to the Geoscience Toolbox
9:02 AM – 9:17 AM

Regional-scale till geochemistry and mineralogy surveys conducted in British Columbia can have a low sample density (e.g., 1 sample/10 km^2) compared to other geochemical prospecting methods such as B-horizon soil geochemistry. Traditional magnetic and radiometric surveys can provide insight into subglacial till composition between sample locations; however, they are often too costly, time-consuming, or have poor spatial resolution. Remotely piloted aircraft systems (RPAS) provide an opportunity to collect high-resolution data for drift prospecting studies quickly and affordably but they have not been tested in this application. In 2021, we investigated the utility of RPAS-borne magnetometry and gamma-ray spectrometry to detect porphyry-related dispersal trains in subglacial tills. A total of 155 line-kilometres were flown in cutblocks near Mount Polley mine and Woodjam developed prospect. Here, existing geology, geochemistry, mineralogy and geophysical datasets provided geological control and a way of validating newly acquired RPAS-borne data. The aircraft flew gridded autopilot surveys at 5, 7.5 or 10 m above ground level (AGL) within cutblocks over subglacial tills. A radar altimeter instructed the RPAS, in real-time, to maintain a constant height AGL, ensuring measured data variation was not related to changes in distance between the geophysical sensors and ground. LiDAR and air photo surveys were flown using the RPAS platform for the same areas to support large-scale surficial geology mapping and interpretation of ice-flow and till transport histories. This work demonstrates that commercially available hardware and software systems, from different manufacturers, can be integrated to fly low-altitude, active terrain-following RPAS geophysical surveys. The magnetic and radiometric data collected are high quality and fill a scale gap between traditional airborne and ground surveys. The next phase of this project will focus on characterizing the radiometric and magnetic signal of subglacial tills derived from potassium- and magnetite-rich porphyry systems and unmineralized country rock.

Faults, Fluids and Landscape Evolution in the Canadian Cordillera

Dawn Kellett, Geological Survey of Canada - Atlantic; Nicolas Pinet, Geological Survey of Canada - Quebec; and Jeremy Powell, Geological Survey of Canada - Ottawa

Additions to the Geoscience Toolbox
9:19 AM – 9:34 AM

The northern Canadian Cordillera is an accretionary orogen that has developed outboard of and along the northwest margin of North America since the mid-Paleozoic. By the latest Cretaceous, many of the elements of the northern Canadian Cordillera (including the ancestral margin of North America and accreted terranes), and their related ore systems, were in place; however, the latest Cretaceous to Paleogene saw emplacement of several magmatic suites (e.g., Casino, Prospector Mountain, Carmacks, Sloko-Hyder); significant dextral translation and lithospheric-scale segmentation of the orogen interior along the major Denali and Tintina faults, as well as several other significant strike-slip faults (e.g., Llewellyn, Big Creek, Teslin); and formation of a range of associated magmatic and hydrothermal ore deposits in upper crustal rocks.

Magmatic history is relatively straightforward to reconstruct through conventional geochronological, petrological and geochemical methods. In contrast, precise timing and conditions of fault slip (and reactivations), landscape evolution, and fluids associated with mineralization within the upper crust have historically been more challenging to characterize. This presentation will explore new datasets emerging from the northern Canadian Cordillera using state-of-the-art geochronometry and thermochronometry methods appropriate for studying faults, fluids and landscape evolution. These datasets show that during the latest Cretaceous and Paleocene−Eocene, the orogen interior was punctuated by episodic, structurally channelled (mineralized) fluid flux through the upper crust, as well as broad-scale and rapid unroofing.

The available fault, fluid and landscape evolution datasets are a launching point for GEM-GeoNorth 2020–2027 research. Further development of these datasets will provide the inputs needed to define the tectonic context for mineralizing events during this period of the northern Canadian Cordillera's history and the preservation potential of mineral deposits. Modelling approaches required to interpret low-temperature thermochronological data will benefit from a new fully relational database of all available thermochronological data within the GEM-GeoNorth footprint.

New Methods for Quantifying Mineralogy at the Thin Section to Deposit Scale: Implications for Paragenesis, Mineral Exploration and Geometallurgy

Shaun Barker, Director and Associate Professor, Mineral Deposit Research Unit, The University of British Columbia

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Additions to the Geoscience Toolbox
9:36 AM – 9:51 AM

Within ore deposits and surrounding rocks it is important to identify and quantify mineral species. The spatial and temporal relationships between minerals allow reconstruction of the pressure, temperature and chemical conditions under which ore mineralization developed. The presence and abundance of minerals can also be used to determine the proximity of samples to ore (e.g., ore deposit vectoring), and has implications for mineral processing (e.g., geometallurgy). Typically, detailed mineralogical information is based on careful observations of drill core by geologists and petrographic analysis using thin sections. In recent years, development of automated mineralogy approaches, such as scanning electron microscopy, micro X-ray fluorescence (µXRF) and calculated mineralogy mean that mineral species can now be rapidly quantified on core or rock samples up to approximately 20 cm in length. These detailed mineralogical data, collected at the millimetre to centimetre scale, can be linked to lithogeochemical and hyperspectral infrared data that is now being routinely collected by many mineral exploration companies at the whole-of-deposit (more than km) scale using emerging calculated mineralogy techniques. It is now possible to link the datasets collected at fundamentally different scales, and extrapolate mineral quantification made at the millimetre to centimetre scale to the kilometre scale. In this presentation I will demonstrate how these analytical data are collected, used and integrated. I will also highlight the critical role that data science will play in enabling geologists to extract significantly more information from the datasets that they are already collecting. Ultimately, improved mineralogical understanding at the deposit scale allows improved decision making around exploration targeting, resource development, mineral processing and mine waste handling.

Targeting Porphyry Deposit Hostrocks using Geophysics in British Columbia's Central Quesnel Terrane

Dianne Mitchinson, Mineral Deposit Research Unit, The University of British Columbia; Dominique Fournier, Mira Geoscience Ltd.; Devin Cowan, The University of British Columbia; Thibaut Astic, The University of British Columbia; Robert Lee, Mineral Deposit Research Unit, The University of British Columbia

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Additions to the Geoscience Toolbox
9:53 AM – 10:08 AM

Demand for copper is growing with global movements to electrify the economy; however, discoveries of mineable copper resources have slowed significantly during the last decade. Future new mineral discoveries are likely to be made in places that have been underexplored or are difficult to access. British Columbia is well known for having geology favourable for porphyry copper-gold deposits. A large number of developed porphyry deposit properties, occurrences and prospects occur in BC; however, some regions are clearly underexplored due to extensive (primarily glacially derived) surficial deposits. One such region that is particularly interesting is an approximately 250 km by 100 km area within the central Quesnel Terrane. Very few porphyry copper-gold occurrences exist within this region, yet hundreds of porphyry occurrences are identified north and south of it; the Mt. Milligan and Mount Polley mines bookend the area.

The Geoscience BC–funded *Identification of New Porphyry Potential Undercover* project used publicly-available geophysical data to model overburden thickness and identify new porphyry exploration targets undercover. Interpretations of overburden-bedrock contacts from conductivity models combined with groundwater well, exploration drilling and outcrop data provides constraints for a revised overburden thickness model for the central Quesnel Terrane. A suite of magnetic targets were chosen, guided by geophysical patterns characterizing known porphyry deposit hostrocks in the northern and southern Quesnel Terrane. Three-dimensional magnetic and gravity inversion models were completed to estimate magnetic susceptibility and density values for each target. Targets were prioritized based on petrophysical similarities to known Quesnel Terrane porphyry hostrocks, how thick the overburden is above them and additional cultural and geographical factors. The prioritized targets and associated 3D magnetic susceptibility and density models can be used by porphyry explorers in BC to direct exploration and claim staking in this prospective but underexplored region.

Application of Indicator Minerals to Identify Fertile Porphyry and Epithermal Ore Systems

Robert G. Lee, Shaun Barker and Farhad Bouzari, Mineral Deposit Research Unit, The University of British Columbia; Alain Plouffe, Geological Survey of Canada

Additions to the Geoscience Toolbox
10:10 AM – 10:25 AM

Indicator minerals, as applied to exploration, are minerals that are either directly linked to mineralization or have trace-element composition and textural characterization that record the presence of a magmatic hydrothermal fluid that formed an ore deposit. Successful discoveries of diamondiferous kimberlites and critical mineral deposits using indicator minerals testify to their usefulness in the exploration toolbox. The large-scale footprint of porphyry and epithermal systems and the numerous types of indicator minerals present within these systems make it challenging to apply a consistent mineralogical approach for exploration. In porphyry systems, indicator minerals can include ore (e.g., chalcopyrite, gold grains, molybdenite), magmatic (e.g., zircon, apatite, titanite, rutile, plagioclase) or hydrothermal alteration minerals (e.g., chlorite, epidote, apatite, titanite, rutile, magnetite, pyrite, hematite, andalusite, mica, albite, K-feldspar). These minerals also form in rocks barren of mineralization. It can be challenging to interpret the subtle changes in mineral composition and texture to determine if they define porphyry mineralization potential or not.

This talk discusses recent research on indicator minerals from porphyry deposits in the North American Cordillera and selected districts worldwide. Critical features in indicator mineral chemistry and texture can help identify potential targets with minerals such as zircon and apatite, providing a temporal history of the source magma and magmatic fluids. Distally, chlorite and epidote composition changes discriminate large-scale provenance metasomatism from porphyry hydrothermal alteration. Sampling resistate indicator minerals both in bedrock and detrital catchment provides means to fingerprint orebodies and drive targeted exploration vectoring. The application of indicator minerals to identify porphyry systems is a valid approach to exploration when using the correct sampling scale, analytical equipment and modelling interpretations.

Emerging Strategies for Exploration Under Cover

Dave Sacco, Surficial Exploration Manager, Palmer

Additions to the Geoscience Toolbox
10:27 AM – 10:42 AM

We've all heard it said, the 'low-hanging fruit' of mineral deposits have been discovered. As a result, exploration under cover is increasingly necessary. Many methods are available to explore under cover, but few have the reliability of subglacial till sampling, which has been used for decades to identify mineral exploration targets. Unfortunately, till is not an easy medium to sample. It consists of an overconsolidated, cement-like matrix containing pebbles, cobbles and boulders. As any seasoned till sampler will tell you, the harder it is to dig, the better the sample. As a result, most till sampling programs rely on 'opportunistic' sampling protocols that use existing sediment exposures such as roadcuts and stream cuts to access the depths required to collect reliable samples, or samples may be collected from inappropriately shallow depths so that their geochemistry is altered by surface processes. Relying on existing exposures compromises the distribution of sample locations in regional surveys, and the scarcity of suitable exposures make property-scale surveys nearly impossible without significant investment. Furthermore, the till is sometimes buried below other materials and inaccessible using conventional pick-and-shovel sampling methods.

Recent innovations in shallow-drilling technology have overcome these impediments to till sampling. Coupled with a location-specific strategy based on a detailed understanding of the surficial geology, effective till sampling programs can be achieved even in the most challenging surficial environments. With reference to Geoscience BC's Central Interior Copper-Gold Research (CICGR) surficial exploration project, this talk will introduce the new shallow-drilling technology that has helped optimize till sampling distribution and coverage following exploration-focused surficial geology mapping. The ability to collect samples anywhere till occurs—at surface or buried beneath mantles of other materials—improves the results of regional surveys and provides game-changing opportunities for property-scale exploration under cover.

Absent or Present? The Role of Ancient Crust in Copper-Gold–Rich Environments

Luke Ootes, Senior Minerals Geologist, Gold, BC Geological Survey

Additions to the Geoscience Toolbox
10:44 AM – 10:58 AM

Mineral deposit concentrations result from crustal processes in a tectonically active environment. Although different tectonic environments yield dramatically different deposit types (e.g., porphyry versus orogenic) they can contain similar commodities (e.g., gold). This presentation examines geological environments that are copper and, more particularly, gold rich. Less emphasis is placed on the deposits' tectonic and concentration processes; instead, the focus is on whether the pre-existing and syngenetic crust is juvenile, evolved or a mix. Juvenile environments include those built on oceanic crust, whereas evolved environments require some continental involvement in their genesis. The testing tools include analysis of radiogenic isotopes (Pb, Sr, Nd, Hf, Os) and stable isotopes (e.g., O, B) in igneous and detrital rocks and minerals. Copper-gold–rich domains typically have strong alteration associated with mineral concentrations and in general unaltered hostrocks are necessary to unravel the nature of the pre-existing crust.

Stikinia and Quesnellia are considered kindred terranes that accreted to western North America during the Mesozoic. Stikinia has a massive copper-gold endowment and gold is a typical primary commodity in its VMS, epithermal and porphyry deposits. Quesnellia also hosts impressive porphyry copper deposits but overall appears gold poor compared to Stikinia. Their available isotopic records are examined to determine if this discrepancy is a result of too much Ancient crust playing a role in the late Paleozoic through Mesozoic evolution of Quesnellia. This concept will be compared with other gold-rich terranes (e.g., Abitibi belt in Ontario and Quebec) to help understand if juvenile oceanic terranes are prerequisites to gold-rich exploration environments.

THEME SESSION: ENGAGE. CONNECT. EVOLVE.

A Pathway for Carbon-Negative Mining of Critical and Battery Metals

Greg Dipple, MDRU Associate Director, Mineral Deposit Research Unit, The University of British Columbia

Theme Session
1:37 PM – 1:52 PM

Alkaline waste generated from mining of ultramafic rocks reacts spontaneously with atmospheric carbon dioxide (CO_2) to permanently store carbon in solid mineral form. The total capacity of these mine tailings to sequester carbon is about ten times greater than the greenhouse gas emissions of associated mining and mineral processing. Waste from current mining activities globally has the capacity to sequester 100–200 million tonnes of CO_2 per year; however, passive, or unintentional, CO_2 mineralization at individual mine sites is modest (1–50 kt/y). Characterization of mine-waste reactivity to CO_2 in air, expressed as labile Mg, varies substantially between and within individual deposits. Some deposits and some types of hydrothermal alteration have the capacity to sequester CO_2 far in excess of carbon emissions associated with mining through direct capture of CO_2 from air; thus, mining of this material can sequester more carbon than is emitted from mine operations. Large individual mines could sequester carbon at a net rate of 1 million tonnes per year—a rate commensurate with conventional carbon capture and storage facilities, but with the advantage that the CO_2 is captured from air and stored in solid mineral form. This opens the possibility that mining of ultramafic rock may contribute to the achievement of net-negative CO_2 emissions within the next century, a remediation scenario that may become necessary if we are to avoid two degrees of global warming given current global trends in anthropogenic greenhouse gas emissions.

Evolution of Ore Deposit Models and Creating Exploration Search Space

Tim Ireland, Principal Exploration Geologist, First Quantum Minerals Ltd.

Theme Session
1:58 PM – 2:18 PM

Exploration models are a kind of geoscience shorthand. Elegant, well-conceived models manage to communicate a whole set of complicated interrelated geological ideas simultaneously. They also bring to mind a set of resource economics and operational scenarios. Models are, however, not static—they evolve with the advance of mineral deposit geoscience.

Is there porphyry potential in epithermal belts? Nowadays it has become routine that we see advanced argillic alteration and think porphyry potential, but prior to the mid-1980s that was not the case. The model evolved quietly over a decade and the late 1990s saw the publication of seminal work at Lepanto (Philippines) that

demonstrated that porphyry deposits and some epithermal deposits were parts of the anatomy of the same system.

The persistent features of a model testify to the common occurrence of those features, though it is also true that models guide our eyes and by seeing only what we expect to see, preconceived ideas can be reinforced. So models are both a useful proxy for what is common, but also limit geological imagination. Where models are loosely constrained there are opportunities for model evolution—this is key to expanding exploration search space.

Hints of the opportunities take the form of deposits that do not fit established models; for instance, no current model deals well with First Quantum Minerals' Enterprise sediment-hosted nickel deposit (Zambia). At first glance it seems to share general characteristics of sediment-hosted copper deposits. In which case, is there sediment-hosted nickel in other salty basins? And if so, what does this mean for the behaviour of nickel in hydrothermal fluids more broadly? Could there be a class (or classes) of hydrothermal nickel deposits globally that have—miraculously—gone undiscovered to this day? I will introduce and discuss several such opportunities among common ore deposit models: opportunities to expand search space, including some specifically relevant to explorers in British Columbia.

Role of Partnerships in Delivering Complex Metallurgical Projects

Jared Osborne and Geoff Boddy, Rio Tinto

Theme Session
2:24 PM – 2:44 PM

The Jadar project in Serbia is one of the largest greenfield lithium projects in the world. The scale and high-grade nature of the Jadar deposit provides the potential to supply lithium to the electric vehicle value chain for decades. The deposit contains jadarite, a lithium sodium borosilicate mineral that Rio Tinto discovered in 2004, near the city of Loznica in western Serbia. To date this unique mineral has not been found anywhere else other than the Jadar valley.

Jadar will produce battery-grade lithium carbonate, a critical mineral used in large-scale production of batteries for electric vehicles and storing renewable energy. In addition, Jadar will produce borates, which are needed for the development of renewable energy equipment such as solar panels and wind turbines.

The proposed development will include an underground mine with associated infrastructure and equipment, including electric haul trucks, as well as a beneficiation chemical processing plant to produce battery-grade lithium carbonate.

Extracting the lithium and boron from the jadarite was an exciting challenge—it is a new mineral with no reference points and no known process anywhere in the world that could be used as a template for extraction.

In the presentation we will introduce our development capability in Rio Tinto and use the development of the Jadar project as an example of the importance we place on leveraging our partnerships to deliver our growth pipeline.

Automated Logging using Machine Vision: Using Large Datasets to Improve Geological Models

Shawn Hood, Chief Technology Officer, GoldSpot Discoveries

Theme Session
2:50 PM – 3:05 PM

Machine learning and computer vision techniques are increasingly being used to standardize descriptive processes in geology, such as drill core logging. The result is a rapid increase in data quantity and quality. The presented case study demonstrates how a large number of drill core images can be processed using artificial intelligence and cloud computing methods to extract geological data. The desurveyed results are represented in three dimensions (3D) and used to produce a block model for download by end users, e.g., geoscientists, technicians or engineers. The discussion of automated logging benefits in the mining industry tends to focus on productivity: the efficient use of personnel and the related time/money savings; however, the rapid creation of consistent geoscientific information can reduce risk by creating better decision-making tools, namely, geological models. Improvements can be observed at the drillhole scale (precision and accuracy of automatically extracted information versus manually logged information) and in a holistic macro scale (comparing models made from large datasets to earlier models made using insufficient data to represent geological features).

Managing Tailings Storage Facilities—The Impact of the Digital Transformation and Cloud-Based Workflow Technology on Achieving the Targets of The Global Standard

Janina Elliott, Pieter Neethling and Chris Kelln, Seequent; Alex Pienaar, Sensemetrics

Theme Session
3:05 PM – 3:20 PM

Tailings storage facilities are an integral part of sustainable and responsible mining. To maintain dam resilience and comply with changing environmental, social and governance factors, consistent disclosure in working with industry and community as well as with regulatory bodies and financial stakeholders has become a key operational objective. As such, many large companies have established dedicated task forces to ensure these facilities are built, monitored, managed and closed safely with minimal risk as outlined by the Global Tailings Standard. But how can the companies provide surety?

The ability to minimize risk is based on two key elements. One is the development of a comprehensive knowledge base that provides complete transparency regarding legacy information and current data. The second is the digital transformation of the ‘monitor to model to design’ workflow that bridges the gap between typically disconnected analytical methods and geoscientific subject matter experts. Rigorous monitoring through sensor data,

empowered through the Internet of Things (IoT) technology, allows us to understand how facilities behave today. The missing element is the ability to detect a system change and contextually integrate the information into the latest geological, geophysical and hydrogeological models. This is the first step towards a true digital twin, i.e., the representation of the complete physical system through correlated models, numeric or otherwise, and the foundation for engineers to make informed and proactive decisions about a facility's performance as it evolves.

Today, both key elements can be addressed by cloud-based data management systems, which have proven to facilitate the real-time access to version-controlled data as well as the collective intelligence of an organization, irrespective of location. Through interactive web visualization and communication tools the development of a true digital twin, centred on as-built performance and failure prevention, has become a reality in mitigating risk in the long term.

PRECIOUS METALS

Exploration Implications of Advanced Argillic Minerals in Epithermal and Porphyry Deposit Environments

Antonio Arribas, The University of Texas at El Paso; Jeffrey W. Hedenquist, University of Ottawa

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Precious Metals
9:05 AM – 9:35 AM

Advanced argillic minerals, including alunite, kaolinite, dickite and pyrophyllite, form in five distinct geological environments of hydrolytic alteration, potentially related to hydrothermal gold deposits: i) Where an intrusion-related hydrothermal system, typical of that associated with porphyry copper ± gold deposits, evolves to white mica stability, continued ascent and cooling of the white mica–stable liquid results in pyrophyllite (± diaspore) becoming stable near the base of the lithocap. ii) A well-understood hypogene environment of formation is vapour condensation near volcanic vents, where magmatic SO_2 and HCl condense into local groundwater to produce H_2SO_4 and HCl-rich solutions with a pH of 1–1.5. Dissolution of the hostrock results in a largely barren siliceous residue, commonly with a vuggy texture, the main host to subsequent high-sulphidation gold-enargite deposition. Alunite and kaolinite (or dickite or pyrophyllite at higher temperatures) form a halo around the residual quartz within a lithocap horizon. iii) Boiling generates vapour with CO_2 and H_2S; atmospheric O_2 in the vadose zone causes oxidation of H_2S-bearing condensates to sulphuric acid, forming a steam-heated acid-sulphate solution, pH 2–3, plus kaolinite and alunite above the water table at < 100°C. Silica derived within the vadose zone will precipitate as amorphous silica at the water table. iv) By contrast, where condensation of this vapour occurs below the water table, the CO_2 in solution forms carbonic acid (H_2CO_3) with pH 4–5. This marginal carapace of steam-heated condensate, up to 150–170°C, forms intermediate argillic alteration of clays, kaolinite and iron-manganese carbonates. v) The final setting is supergene, mainly caused by post-hydrothermal weathering and oxidation of pyrite, locally creating pH < 1 liquid, and forming kaolinite, alunite and iron oxyhydroxides.

This genetic framework can be used to help focus exploration for gold-rich hydrothermal ore deposits, including epithermal, porphyry and volcanic-hosted massive sulphide deposit types.

Archean Troilus Gold-Copper Deposit, a Polyphased Low-Grade Bulk Tonnage Deposit Located in Northern Quebec, Canada

Blake Hylands, Senior Vice President of Exploration, Troilus Gold Corp.

Precious Metals

9:35 AM – 10:00 AM

The Troilus gold-copper deposit is in the Opatica Subprovince of the Superior Province, within the Frotet-Evans greenstone belt, which is interpreted as the northern extension of the Abitibi greenstone belt in Quebec, Canada. The former Troilus mine produced approximately 2 million ounces of gold and 70 000 tonnes of copper out of the zones Z87 and ZJ between 1996 and 2010.

The Troilus deposit is hosted within and at the edges of the Troilus diorite, a polyphased synvolcanic pluton of calcalkaline signature emplaced within intermediate to felsic volcanic rocks of the middle Parker Formation. This sequence is in contact with more primitive basaltic rocks of the upper Parker Formation to the southeast. The regional fabric is a strong, northeast–southwest–striking, penetrative foliation dipping to the northwest, which strongly affects the Troilus deposit.

Due to its size and complex geology, the genesis of the Troilus deposit was poorly understood. It was first defined in the nineties as an example of an Archean porphyry due to (among other characteristics) the spatial association of ore with intrusive rocks, its metallic signature (gold-copper-silver), and the observed zonation in alteration (potassic vs. sodic). More recent studies have shown that the Troilus deposit is structurally controlled and therefore has affinities with orogenic gold deposits.

New observations in the ZSW, Z87 and ZJ zones and in the surroundings of the deposit make it clear that the history of the Troilus deposit is more complex than was previously thought. The deposit likely formed as a result of a succession of different hydrothermal events beginning with an early syn-volcanic event (VMS type and possibly intrusion related) that was overprinted by younger syn-deformation mineralization (orogenic gold type). These events led to the current configuration of the Troilus deposit, where ore zones are oriented northeast–southwest following regional foliation orientations.

Defining the Geologic Model at the Cordero Silver-Gold-Lead-Zinc Deposit in Chihuahua, Mexico

Gernot E. Wober, Discovery Silver Corp.; Nadia M. Caira, World Metals Inc.

Precious Metals
10:00 AM – 10:25 AM

Chihuahua, Mexico, hosts a variety of Paleogene argentiferous base-metal deposits that occur along the transition between the Sierra Madre Occidental silicic igneous province and the Mexican Basin and Range sedimentary province.

The Cordero project lies in a region of intense deformation, with earlier east-northeast–directed tectonics reactivating northwest-trending, basin-bounding faults as reverse faults with sinistral components. A realignment of the region to east-northeast–directed extension facilitated basin sedimentation and subsidence, volcanism, magmatic activity and fluid flow that set the scene for the emplacement of the Cordero magmatic-hydrothermal system and mineralization events creating the deposit.

The project lies in an isolated Cretaceous sedimentary basin, the Mezcalera Formation, comprising marine sediments, remnants of an inland sea, and host to several nearby silver, lead, zinc (gold) mineral deposits.

The Cordero shallow-level magmatic system was emplaced into the Mezcalera Formation as a series of texturally varied, compositionally similar, interconnected hypabyssal bodies. The magmatic system has had a complex history while developing into a disc-shaped laccolith, with interconnected sills, dikes and related breccias including bimictic contact-related and collapse breccias, water-driven peperite, and gas-driven mill matrix breccias providing the space and permeability for mineralization loci.

Mineralization occurs in breccias as a progression from crackle- to puzzle- to mill-matrix breccias, fissure-type epithermal vein and vein breccias, stockwork, disseminate, fracture-fill and skarn/hornfels mineralization with manto-style replacement. The main sulphide species include argentiferous galena, a variety of sphalerites of differing colours and pyrite, with minor arsenopyrite, tetrahedrite, chalcopyrite and rare pyrrhotite.

Cordero has overlapping characteristics of deposit types including an intermediate sulphidation epithermal system on the shoulder of a porphyry molybdenum system and carbonate-hosted lead-zinc (silver, copper, gold) deposits.

Keats Zone: New Found Gold in Newfoundland

Melissa Render, VP of Exploration, New Found Gold Corporation; Miguel Nassif, Senior Structural Geologist, New Found Gold Corporation

Precious Metals
10:25 AM – 10:50 AM

New Found Gold Corporation is a Canadian junior company exploring numerous high-grade orogenic lode gold prospects in the central Newfoundland gold belt. The Queensway project is a district-scale exploration play striking over 100 km and covering 151 025 ha. In addition to the discoveries made to date, which include the Keats, Golden Joint and Lotto zones, the district boasts numerous gold showings and tens of kilometres of untested strike length.

The project lies within the Exploits subzone of the Dunnage zone, which is composed of a fold-thrust sequence of Ordovician turbiditic rocks of the Davidsville Group. The property is transected by two prominent regional-scale structures that formed during orogenesis related to the closing of the Iapetus and Rheic oceans: the Appleton fault zone and the JBP fault zone. Gold mineralization occurs in a variety of quartz vein styles occupying secondary faults that form a network adjacent to the regional structures.

The Keats zone was discovered during the 2019 inaugural diamond drill program by the first hole, which intersected the southwest-plunging domain of bonanza-grade gold. This unique feature of the Keats zone is controlled by high-dilation breccia segments that occur along the second-order Keats-Baseline fault zone. Gold mineralization at the Keats zone is hosted in quartz-dominant breccias and vein arrays related to the Keats-Baseline fault, which transects the north-northeast–trending subvertical stratigraphy. Within this fault zone, quartz vein textures, including brecciated, vuggy and stylolitic, record a complex history of vein formation and incremental growth. The system shows a gold-arsenic-antimony-tungsten metal association in which high-grade quartz-bearing lodes contain coarse-grained gold particles, arsenopyrite, chalcopyrite, boulangerite, iron carbonate and NH_4 muscovite.

With continued drilling and the collection of critical datasets including oriented down-hole images, and spectral, geophysical and geochemical data, the Keats zone's lithostructural framework has started to take form. Understanding the relationship between the high-grade gold mineralization, host stratigraphy and structure will be important for strategizing ongoing exploration efforts.

BASE METALS

Rainbow: A High-Grade Copper Discovery at a Key Time for an Iconic Canadian Mining Town

Max Porterfield, President & CEO, Callinex Mines Inc.

Base Metals
1:35 PM – 1:58 PM

Callinex Mines Inc. is pleased to provide an overview on the recently discovered Rainbow deposit in the prolific Flin Flon mining district, Manitoba. The Rainbow deposit was discovered in the later part of 2020 using a non-traditional vectoring approach for the discovery of VMS deposits in the Flin Flon greenstone belt. The Rainbow deposit is located at the 100%-owned Pine Bay project within a mineral lease, less than 250 m from a high-voltage hydroelectric power line and 550 m from a historical shaft with direct road access to processing facilities in Flin Flon.

Callinex's attraction to the Pine Bay project is that it encompasses the majority of the Baker Patton Complex (BPC), the largest exposed felsic (rhyolitic) volcanic accumulation in the Flin Flon area. This is important because most VMS discoveries in Flin Flon are directly related to rhyolitic flows and volcaniclastic rocks.

Geologically the Rainbow deposit is a newly interpreted fold repeat of the Pine Bay deposit, which is located 600 m east and 500 m north of the Rainbow deposit. The newly interpreted folded horizon that hosts the Rainbow had virtually no previous exploration, and Callinex recognizes huge potential for future discoveries. The Rainbow is the newest deposit discovered along a cross fault that hosts five other deposits to the east, three of which have seen past production.

Mineralization/alteration identified to date includes solid to disseminated sulphides (chalcopyrite, sphalerite, pyrite and pyrrhotite) hosted by a broad (greater than 100 m), sericite-altered, felsic volcanic sequence, transitioning into a more chloritic±sericitic, base-metal–rich alteration footwall, into two solid sulphide horizons (Yellow and Orange zones), capped by silica/sericite and lesser chlorite.

Since the initial discovery in August 2020, Callinex has completed 64 holes (including 12 wedges), totalling 37 750 m.

Filo del Sol: Refocus on Exploration Leads to New Discoveries

Bob Carmichael and Diego Charchaflíe, Filo Mining Corp.

Base Metals
2:03 PM – 2:26 PM

The Filo del Sol project is located in San Juan Province, Argentina and Region III, Chile, 140 km southeast of Copiapó, Chile, and 350 km northwest of San Juan, Argentina, and is accessible by road from both cities.

Filo del Sol is a high-sulphidation epithermal copper-gold-silver deposit superimposed on a very large porphyry copper-gold system. Several styles of mineralization occur, including structurally controlled gold-silver and high-grade supergene-enriched copper within a broader envelope of disseminated and veinlet-hosted sulphide copper and gold mineralization. The mineralized system is associated with middle Miocene porphyry intrusions and overprinting high-sulphidation epithermal alteration within Permo-Triassic rhyolite and granitic basement rocks. The deposit is associated with an extremely large area of hydrothermal alteration, which extends over an area of 18 km^2 and trends along a regional northeasterly structure.

A preliminary feasibility study completed in January 2019 evaluated mining the oxidized copper, gold and silver mineralization and extraction of the three metals through sequential heap leaching. Despite the compelling economics of this study, it was recognized that all drillholes terminated in sulphide mineralization and that the geological model was consistent with the continuation of the hypogene epithermal mineralization to depth along with the likely occurrence of porphyry copper-gold mineralization.

The decision was made to refocus the project on continued exploration beneath the oxide resource. This led to the discovery of a very large, telescoped, high-sulphidation epithermal/porphyry copper-gold system at depth. Known mineralization extends over approximately 4500 m north-south, 1000 m east-west and 1500 m deep and remains open in all directions. In addition to its vast potential, results reported in May 2021 from Hole FSDH041 demonstrated a high-grade zone of the deposit with 163 m at 2.31% copper, 2.07 g/t gold and 183.0 g/t silver within an 858 m intersection at 0.86% copper, 0.70 g/t gold and 48.1 g/t silver. Drilling is underway to further define the deposit.

Geology and Exploration of the Elida Porphyry Copper-Molybdenum Deposit, Peru

Paul Johnston and Richard Osmond, Element 29 Resources Inc.; Manuel Montoya, Globetrotters Resource Group Inc.

Base Metals
2:31 PM – 2:54 PM

The Elida porphyry copper-molybdenum project is located in central Peru, approximately 85 km inland from the coast and at elevations between 1500 and 2000 m. An alteration anomaly recognized from methodically processed advanced spaceborne thermal emission and reflection radiometer (ASTER) scenes was field checked and staked in 2011. Field reconnaissance initiated by Globetrotters Resource Group in 2012 was immediately followed by geological mapping to resolve the scale of the hydrothermal system and establish the porphyry-style mineralization. Drilling in 2014–2015 completed under option by Lundin Mining intersected copper and molybdenum mineralization associated with a sequence of Eocene quartz feldspar porphyry intrusions. Following termination of the Lundin option, the project was moved into a new public company (Element 29 Resources Inc.) to fund continued exploration of the project, including a 4500 m drilling campaign completed in December 2021.

A cluster of individual porphyry centres exposed in outcrops or inferred from alteration patterns are contained within a 2.0 km by 2.5 km sericite-pyrite alteration zone. Drilling to date has focused on one of the porphyry centres, where copper and molybdenite mineralization form a halo around an elliptical, multi-phase quartz monzonite porphyry stock emplaced into a Cretaceous sedimentary and volcanic sequence. The remaining porphyry centres are untested by drilling. Chalcopyrite and molybdenite accompanied by pyrite, magnetite and more localized pyrrhotite are contained in and around multiple episodes of quartz and sulphide veins associated with potassic alteration. Propylitic alteration (chlorite-epidote-pyrite) is developed outboard of potassic alteration. Sericite-pyrite or phyllic alteration overprints potassic and propylitic alteration and persists with variable intensity at depth. Geological interpretation continues to evolve as exploration progresses on this early-stage exploration project.

Surge Copper's Ootsa – Berg Project, Advanced Copper-Molybdenum-Gold Deposits in Central British Columbia

Shane Ebert, Director, President and VP Exploration, Surge Copper Inc.

Base Metals
2:59 PM – 3:22 PM

Abstract not available at print deadline.

Jupiter: An Epizonal Orogenic Gold Discovery in Yukon's Selwyn Basin

Scott Berdahl, CEO & Director, Snowline Gold Corp.; Craig Hart, Chair, Snowline Gold Corp.

BC, Yukon and Alaska
9:02 AM – 9:22 AM

The district-scale Einarson project covers a Neoproterozoic to Cambrian sequence of passive-margin clastic and carbonate rocks within and near the structurally complex eastern margin of Yukon's Selwyn Basin. Focused exploration in 2010 began to assess the region's potential for Carlin-style gold mineralization despite the lack of records of previous boots-on-the-ground gold exploration. Snowline Gold Corp. formed and acquired the Einarson project in 2021 to focus on regional gold discovery opportunities for Carlin-type, intrusion-related and vein-type gold deposits. Recent exploration identified a series of auriferous quartz vein float boulder trains, drawing attention to the opportunity presented by this latter mineralization style.

In 2021, Snowline drill-tested and discovered the in-situ Jupiter vein system with a 4300 m program. Jupiter is a blind target expressed as float boulders and a 3 km long gold-in-soil anomaly. Drilling has so far discovered an extensive, mineralized system with intersections up to 13.2 g/t gold over 6.5 m (J-21-011), along a 1.1 km long region that is up to 200 m wide. The veins are in a structural corridor of highly deformed, latest Neoproterozoic Narchilla Formation sedimentary rocks. The host siltstones are relatively unmetamorphosed but are altered and have variably mineralized halos locally with zones of quartz flooding.

The vein system has several crosscutting vein phases and typically yields multiple mineralized intersections per hole. The veins are quartz and carbonates with a range of textures. Mineralization has high gold-to-silver ratios; is typically associated with acicular arsenopyrite and pyrite and has trace amounts of visible gold, as observed in J-21-020. The veins are locally ribbon-textured with carbonaceous bands but also contain breccias and open-space quartz textures. These and other features indicate that the system is likely an orogenic vein system that was shallowly emplaced, thus is best characterized as an epizonal orogenic gold vein system, similar to recent discoveries in Newfoundland.

Textural Indicators of Vein Genesis at the Bralorne Gold Complex

Terry Harbort, President & CEO, Talisker Resources

BC, Yukon and Alaska
9:25 AM – 9:45 AM

The Bralorne Gold Complex in south-central British Columbia represents Canada's only world-class Phanerozoic orogenic gold belt. With alluvial production beginning in the 1860s and hard-rock gold production dating from 1898 to 2014, Bralorne is the highest grade, longest producing gold camp in BC.

Gold-bearing quartz-carbonate veins are hosted in second- and third-order polyphasic fault structures that dissect the Bridge River–Cadwallader terranes; two composite subterranes that sit within a major plate suture separating the Coastal Plutonic Complex and the Quesnel Terrane. The Bridge River–Cadwallader terranes are a melange consisting of juxtaposed slivers of ophiolitic and accretionary rocks, fault bounded by peridotite of upper mantle origin.

Crystalline and kinematic features observed in veins, and on vein margins indicate a protracted episodic polyphase genesis for vein formation: 1) development of en echelon–linked fracture networks in response to sinistral movement on first-order structures; 2) infiltration of hydrothermal fluids through fracture network and deposition of microcrystalline and cryptocrystalline alteration assemblage resulting in strain hardening of hostrock; 3) formation of through-going fault surface planes to accommodate continued sinistral movement resulting in gouge development and minor tectonic brecciation; 4) transtensional (pull-apart) opening of second-order structures and formation of large voids; 5) influx of silica substrate into void space due to porosity differential; 6) accumulation of silica substrate to fill void space and initiation of quartz crystallization; 7) slow growth of large euhedral omnidirectional quartz crystals and deposition of massive gold; 8) collapse of void walls to develop matrix-suspended collapse breccias; 9) solidification of silica substrate forming large euhedral quartz crystals and mega-coarse gold deposition; 10) development of margin subparallel crack-seal structures from seismogenic fracturing with rapid deposition of a microcrystalline sulphide assemblage and adjacent coarse gold.

The Thorn Project: An Emerging Cretaceous-Jurassic Copper-Gold-Silver-Molybdenum Porphyry Belt

Gary R. Thompson, Chairman & CEO, Brixton Metals Corporation

BC, Yukon and Alaska
9:48 AM – 10:08 AM

Located in northwest British Columbia, the Thorn project is an emerging copper-gold-silver-molybdenum porphyry and epithermal belt. The Thorn property is located within the Stikine Terrane, an Upper Triassic to Lower Jurassic accreted exotic magmatic arc in the Intermontane Belt of the northern Cordillera. Recent dating has identified Eocene, Cretaceous and Triassic porphyry-style mineralization within the newly assembled project.

The Thorn project comprises an 80 km mineralized megatrend with multiple deposit styles and ages. The most advanced-stage targets are the Camp Creek and the Trapper targets. The Camp Creek target is a Cretaceous, calcalkalic copper-gold-silver-molybdenum porphyry, with associated precious metal and copper high-sulfidation veins and mineralized diatreme breccias. The Camp Creek corridor has been the focus of exploration for decades by several operators; however, the copper-dominant porphyry system at depth has only been discovered in recent years. The Trapper target is interpreted to be in the epithermal to porphyry transition and is hosted in Cretaceous diorite and Triassic lapilli tuff. Gold is associated with coarse base-metal–rich veins, in calcite-sulfosalt veinlets, quartz stockwork and disseminated in the hostrocks.

The property has a total of 14 defined copper-gold-silver targets at various stages of exploration. These targets include Metla, a recently acquired Late Triassic copper-gold porphyry centre and the Outlaw target, a multi-kilometre sediment-hosted gold zone. With such a large land package and evident metal endowment, the Thorn project has the potential for prolific deposits on the scale of others found in northern BC.

Perseverance Pays Off – Golden Summit Project, Alaska

Kristina Walcott and Alvin Jackson, Freegold Ventures Limited

BC, Yukon and Alaska
10:11 AM – 10:31 AM

Gold mineralization on the Golden Summit property occurs in three main forms: 1) intrusive-hosted sulphide-quartz stockwork veinlets (such as the Dolphin), 2) auriferous sulphide-quartz veins (exploited by historical underground mines), and 3) shear-hosted, gold-bearing veinlets. All three types are considered to be part of a large-scale, intrusive-related gold system on the property.

The Dolphin gold deposit is hosted by the Dolphin stock, which consists largely of granodiorite and tonalite, similar to the Pedro Dome pluton. It is the only large intrusive body known on the property at this time. The Dolphin stock is approximately the same age as the nearby Fort Knox pluton, which hosts Kinross Gold's Fort Knox gold mine. Freegold made the initial discovery of widespread low-grade gold mineralization in the Dolphin stock during the initial drilling campaign on the prospect in 1995; however, resource definition drilling only commenced in 2011. In 2016, Freegold completed a preliminary economic assessment.

In 2019, following an extensive data review of past drilling and in conjunction with the resource model and block model level plans, Freegold identified what it believed to be the potential for a higher grade corridor of mineralization extending from the area of the old Cleary Hill mine workings toward the Dolphin intrusive. Based on this interpretation, a drill program was initiated on the project in February 2020. Hole GSDL2001 was the initial test of this hypothesis and returned 188 m grading 3.69 g/t gold.

Drilling remains ongoing on the project. Past drilling in the historic Cleary Hill area was largely shallow in nature and the Dolphin intrusive is now interpreted to likely underly the Cleary Hill area at depth.

MPD Project: Gate Zone – Expanding a Significant New Porphyry Copper-Gold Discovery in Southern BC

Jeff Ward and Andrew Berry, Kodiak Copper Corp.

BC, Yukon and Alaska
10:33 AM – 10:53 AM

The MPD project is located in South-central British Columbia, 40 km south of Merritt and 25 km north of Princeton. Kodiak Copper Corp. initially acquired the property in 2018 and since then has expanded the land package to 14 716 ha, consolidating four historical prospect areas into a single project for the first time (Man, Prime, Dillard and Axe).

The MPD project lies within the southern portion of the Quesnel Terrane, BC's primary copper-producing belt that hosts nearby mines such as the world-class Highland Valley mine, New Afton and the Copper Mountain mine. Late Triassic–Early Jurassic alkalic and calcalkalic island-arc volcanics and comagmatic intrusives of the Nicola Group underlie most of the property. Copper-gold mineralization at MPD is hosted by north-trending, steeply dipping, altered dioritic rocks, phyric volcanics and late-stage structurally controlled veining.

The Gate zone was discovered in 2019 by a single drillhole, which tested the north end of a 1 km copper-in-soil anomaly. Additional drilling in 2020 further revealed a high-grade copper-gold zone within a wider mineralized envelope of significant size, including a 282 m intercept with 0.70% copper and 0.49 g/t gold, the highest grades reported from 50 years of historical work the property.

Exploration by Kodiak in 2021 focused on expanding the significant copper-gold mineralization at Gate with systematic drilling. Step-out holes successfully extended copper-gold mineralization to include 950 m of strike (north-south), 350 m in width (east-west) and a depth of 850 m, being open in most directions. The 2021 drill campaign totalled 21 675 metres in 36 holes.

The Gate zone demonstrates excellent potential for further discovery of significant copper-gold zones at MPD, which is typical of other multi-centre copper porphyry deposits in BC. In addition to Gate, future work will test high-priority targets such as Man, Dillard, Dillard East and Axe.

The Gate Zone demonstrates excellent potential for further discovery of significant copper-gold zones at MPD, which is typical of other multi-centre copper porphyry deposits in British Columbia. In addition to Gate, future work will test high-priority targets such as Man, Dillard, Dillard East and Axe.

Presentation by the 2021 Recipient of the H.H. "Spud" Huestis Award

Theodore (Ted) W. Muraro

BC, Yukon and Alaska
10:56 – 10:59

Theodore (Ted) W. Muraro is the recipient of the AME 2021 H.H. "Spud" Huestis Award for significant contributions to enhancing the mineral resources of BC or Yukon. Ted has devoted over 60 years to the mineral industry and continues to be active in leadership and mentorship capacities. Early in what would eventually become a 34-year tenure with Cominco Ltd., he advanced quickly to the position of chief geologist for the company's worldwide exploration activities.

Ted's most notable contribution was the discovery of a gold occurrence in 1965 that would eventually become the Snip gold mine in northwest BC. The Snip mine produced approximately one million ounces of gold from 1991 until 1999 at an average gold grade of 27.5 g/t. In July 2020, present operator, Skeena Resources Limited, released an underground constrained mineral resource estimate for the Snip Gold Project. The Indicated resources include 244,000 ounces of gold hosted within 539,000 tonnes at an average gold grade of 14.0 g/t Au. Ted's additional contributions include his structural and stratigraphic interpretation of the Kootenay Arc, which resulted in the discovery of the Duncan Lake zinc-lead-silver deposit. Subsequently, his detailed mapping and drilling proposal led to the discovery of the Lynx Zone in the Buttle Lake mining district. His push to revive Cominco's Arctic exploration ultimately resulted in the development of the Polaris lead-zinc mine.

In 1990 Ted left Cominco to join Romanex Management, and his technical direction of work in East Africa for Sutton Resources Ltd. played a large part in their international successes.

Ted's genuine passion for rocks and people is at the root of his accomplishment. Ted sees the potential for projects passed over by others and invests significant time as a mentor to geologists and prospectors. Ted holds bachelor's and master's degrees in geological engineering and undertook several years of post-graduate work at Stanford University. He is an internationally recognized authority on carbonate-hosted lead-zinc deposits and continues to be sought out for his knowledge.

In recognition of his lifelong achievements and continuing contributions to excellence in mineral exploration, AME is honoured to present Ted Muraro with the prestigious H.H. "Spud" Huestis Award.

ASCOT RESOURCES LTD.

PREMIER GOLD PROJECT – DEVELOPING HIGH-GRADE GOLD MINES IN THE GOLDEN TRIANGLE OF BRITISH COLUMBIA

Lawrence Tsang, Senior Geologist, Ascot Resources Ltd.; Lars Beggerow, VP Geoscience and Exploration, Ascot Resources Ltd.

The Premier Gold and Red Mountain Gold Projects are located in the southern Golden Triangle, near Stewart, BC where Ascot has large land holdings exceeding 25 000 ha. The combined recent and historical drilling at both Projects amounts to almost 1million metres. In the 2021 season, Ascot completed over 18 000 m of drilling at the Premier Gold Project focused on the Northern Light West (Premier Deposit) and Day Zone South (Big Missouri Deposit) near mine exploration areas, and drill tested new exploration targets that were outlined by geophysical IP anomalies located 400m NW of the Premier deposit and in the Sebakwe area.

The Stewart mining camp is underlain by Triassic-Jurassic Stuhini Group and Hazelton Group rocks that formed in an island-arc setting. The Premier, Big Missouri, and Silver Coin deposits in the Premier camp are structurally controlled and hosted in a sequence of intermediate volcanic and volcaniclastic rocks with dacitic intrusions of “Premier porphyry” and minor amounts of argillite at Big Missouri and Silver Coin. The Premier Gold Project is an intermediate sulfidation epithermal gold-silver deposit with subsidiary base metals. The mineralized bodies at Premier are hosted by quartz breccias and associated stockwork with pyrite, sphalerite, galena, chalcopyrite, electrum, and visible gold.

The 2021 drill program has successfully extended mineralization in the near mine exploration areas at both the Premier deposit (the Northern Light West) and the Big Missouri deposit (the Day Zone South). Mineralization intercepted at the Day Zone South confirmed the expansion of the Day Zone for approximately 400m to the South. The Northern Light West drilling identified more high-grade mineralization outside of existing resources. In addition, exploration drilling in the Sebakwe area intercepted multiple lenses of quartz breccia bodies and stockwork zones indicating the expansion potential of the Premier deposit. Also, a new high-grade copper-silver mineralized zone was discovered 400 m NW of the Premier deposit.

AURELIUS MINERALS INC.

AUREUS EAST PROJECT: DISCOVERING CONSIDERABLE NEW GOLD ZONES IN NOVA SCOTIA

Jeremy Niemi, Aurelius Minerals Inc.; Scott Zelligan, Aurelius Minerals Inc.; Morgan Verge, Aurelius Minerals Inc.

In 2020, Aurelius Minerals acquired the Aureus East property near Port Dufferin, Nova Scotia. The site is host to a known gold deposit and historic underground operations. Recent exploration work has identified over 30 new gold zones, tripling the known depth of the deposit. A maiden resource estimate for Aureus East is expected to be released in early 2022.

The Aureus East deposit occurs in the Meguma Terrane in the eastern shore of Nova Scotia. The Meguma Terrane, the principal host of gold deposits in Nova Scotia, is a package of Lower Paleozoic-age, turbiditic, clastic sedimentary rocks, which were deformed into east-trending folds and regionally metamorphosed to greenschist, and locally amphibolite, facies grade during the Acadian Orogeny. The region has a history of gold production dating back to the 1860s. Meguma gold deposits are a sub-type of orogenic gold deposits.

The Aureus East property is underlain by metasediments of the Goldenville Formation, principally greywacke with minor interbedded argillite, and the Halifax Formation, composed of black, graphitic slate, that are folded into a series of gently east-plunging, upright anticlines and synclines. Mineralization occurs in quartz veins and altered wall rock accompanied by 2 to 5% sulfides. Historically, high-grade veins were exploited (5-30 g/t Au), but recent exploration indicates large volumes of lower-grade, bulk-mineable mineralization. Visible gold is commonly found in core and is hosted within the quartz veins, or disseminated in the softer argillite wall rock, and with clusters of Arsenopyrite.

Nearly 18 000 metres were drilled at the Aureus East project during Phase 1 and 2, where over 30 new gold zones have been identified. One of these new zones is Gold Zone 9, which has been intersected in multiple holes over an 80 m strike length.

AZIMUT EXPLORATION INC.

EXPANDING THE PATWON GOLD DISCOVERY ON THE ELMER PROPERTY, JAMES BAY REGION, QUEBEC, CANADA

Jean-Marc Lulin, President and CEO; Simon Houle, Chief Geologist; and François Bissonnette, Operations Manager, Azimut Exploration Inc.

Patwon is a rapidly advancing gold discovery in the James Bay region of Quebec. Azimut's wholly owned Elmer property is situated in the La Grande Archean Subprovince in the Superior Province, specifically in the Lower Eastmain greenstone belt. The property consists of 515 claims (271.3 km^2) over a 35-kilometre strike length, located 800 kilometres north of Montreal, 60 kilometres east of the village of Eastmain and 115 kilometres west of Newmont's Eleonore mine. The project benefits from quality infrastructure nearby, such as a permanent road, airport and power grid.

Drilling to date has traced a consistently mineralized zone from surface over a strike length of 520 metres and to a depth of 450 metres. This steeply dipping zone reaches up to 82 metres thick and is geometrically robust with strong growth potential.

The best holes to date include:

- 28.0 g/t Au over 18.0 m
- 3.15 g/t Au over 102.5 m
- 3.01 g/t Au over 90.20 m
- 6.43 g/t Au over 40.6 m
- 4.43 g/t Au over 46.0 m

Elmer is considered an orogenic gold-bearing system within a 3-kilometre-thick felsic volcanic sequence with porphyritic intrusions, mafic volcanics and gabbroic sills. The mineralization is mainly related to quartz-vein networks and their host rocks, with pyrite as the dominant sulphide occurring as fine to coarse disseminations, crosscutting stringers or semi-massive to massive lenses. Native gold grains are frequent. Alteration comprises pervasive silica, chlorite, sericite, carbonate and tourmaline. The intensity of quartz veining may be partly controlled by the rheologic contrast between the host felsic lithologies and mafic lithologies within a more extensive shear zone.

A new 20 000-metre drilling program is underway to expand Patwon, test new targets, and prepare for a maiden NI 43-101 compliant resource estimate.

BRIXTON METALS CORPORATION

THORN PROJECT: AN EMERGING CRETACEOUS-JURASSIC CU-AU-AG-MO PORPHYRY BELT

Gary Thompson, President & CEO; Christina Anstey, VP Exploration and Colin McGillicray, Senior Project Geologist, Brixton Metals

Located in northwest BC, the Thorn Project hosts an emerging Cu-Au-Ag-Mo porphyry and epithermal belt. The Thorn Property is located within the Stikine Terrane, an Upper Triassic to Lower Jurassic accreted exotic magmatic arc in the Intermontane belt of the northern Cordillera. Recent age dating has identified Eocene, Cretaceous and Triassic porphyry style mineralization within the project area.

The Thorn Project comprises an 80km mineralized megatrend with multiple deposit styles and ages. The most advanced stage targets are the Camp Creek and the Trapper Targets. The Camp Creek Target is a Cretaceous aged, calc-alkalic Cu-Au-Ag-Mo porphyry, with associated precious metal and copper high sulfidation veins and mineralized diatreme breccias. The Camp Creek Corridor has been the focus of exploration for decades by several operators however the copper dominant porphyry system at depth has only been discovered in recent years. The Trapper Target is interpreted to be in the epithermal to porphyry transition and is hosted in Cretaceous aged diorite and Triassic lapilli tuff. Gold is associated with coarse base metal rich veins, in calcite-sulfosalt veinlets, quartz-stockwork and disseminated in the host rocks.

The property has a total of 14 defined Cu-Au-Ag targets at various stages of exploration. These targets include Metla, a recently acquired Late-Triassic Cu-Au porphyry centre and the Outlaw Target, a multi-kilometer sediment hosted gold zone. With such a large land package, along with evident metal endowment, the Thorn Project has the potential for prolific deposits on the scale of others found in northern BC.

CALLINEX MINES INC.

RAINBOW DEPOSIT: A HIGH GRADE COPPER DISCOVERY

J.J O'Donnell, P.Geo., Consulting Geologist, Callinex Mines Inc.

Callinex Mines Inc. (TSXV: CNX) (OTC: CLLXF) is pleased to update our Vancouver Roundup followers with progress made at the new Rainbow Deposit in the prolific Flin Flon Mining District, Manitoba. The Rainbow Deposit was discovered in the later part of 2020 with drilling resuming February 2021 and completing an additional 57 holes (including 10 wedges), totaling 33 400 metres. Core featured highlights the successful drilling campaign carried out in 2021, which includes the widest intersection to date: **PBM-138** which intersected the Rainbow (Orange) Zone **580m below surface and from 660.00-697.00m (33.25 true width) which returned assays of 0.35 g/t Au, 6.38 g/t Ag, 6.28 % Cu, and 0.10% Zn.** Also highlighted **(Information to follow has not been made public, however will be made public prior to convention).**

Mineralization / alteration identified to date includes solid to disseminated sulphides (Chalcopyrite, Sphalerite, Pyrite, and Pyrrhotite), hosted by a broad (+100m) sericite altered felsic volcanic sequence, transitioning into more chloritic +/- sericite base metal rich alteration footwall, into two solid sulphide horizons (Yellow and Orange Zones), capped by silica/sericite/ and less chlorite.

Callinex's initial attraction to the Pine Bay Project was that the geology encompasses the majority of the Baker Patton Complex (BPC), which is the largest exposed felsic (rhyolitic) volcanic accumulation in the Flin Flon area. This is important since the majority of the VHMS discoveries in Flin Flon are directly related to rhyolitic flows and volcaniclastic rocks

Geologically the Rainbow Deposit is a newly interpreted fold repeat of the Pine Bay Deposit which is located 600 metres east and 500 metres north of CNX's current intersections. The newly interpreted folded horizon which hosts the Rainbow Discovery had virtually no previous exploration, and Callinex recognizes huge potential for additional future discoveries.

EXPLORATION ADVANCES AND OPPORTUNITY IN THE CASSIAR GOLD DISTRICT

Kaesy Gladwin, VP Exploration, Cassiar Gold Corp.; Jill Maxwell, Exploration Manager, Cassiar Gold Corp.

The Cassiar gold district in north-central British Columbia lies along a belt of orogenic gold deposits in eastern British Columbia that includes the Cariboo, Barkerville, and Sheep Creek districts. The camp is hosted by the Sylvester Allochthon, composed of stacked, shallowly-dipping panels of Paleozoic to early Mesozoic mafic volcanic rocks, ultramafic sills, and fine-grained siliciclastic sediments. Regional Jurassic to Mesozoic deformation is associated with auriferous gold veins in the district.

Gold-bearing quartz veins occur in stacked mafic volcanic panels along a 15 km north-northwest trending corridor, controlled by low-angle thrust faulting localized along weaker listwanite and sedimentary horizons. This corridor is concordant with the dominant lineation trend representative of the transportation direction of thrust faults. Auriferous veins form perpendicular to this trend. Veins may occur at deflections of lithological contacts or may accommodate offsets of contacts between competent units and weaker adjacent units.

Mineralization style varies across the property. Cassiar South hosts multiple high-grade quartz vein deposits, with over 350 000 oz of past production. High-grade mineralization is associated with east-northeast trending quartz-carbonate veins occurring beneath ultramafic sheets or stepped downward within mafic volcanic panels. Mineralized veins include minor sulphide mineralization, commonly with visible gold.

The Cassiar North area hosts the near-surface Taurus bulk-tonnage deposit, with a one million ounce inferred resource at 1.43 g/t gold. The deposit is characterized by sheeted quartz-carbonate extension veins and shear veins hosted in gently-dipping mafic volcanic rocks, with disseminated pyrite-carbonate alteration forming bulk mineralized zones and higher-grade corridors proximal to veins.

Previous exploration has largely focused near areas of historical production, leaving significant potential in targets including lateral vein extensions, new parallel veins, new internal high-grade corridors within bulk mineralized zones, and stacked vein systems which remain untested.

COAST COPPER CORP.

REDISCOVERING THE HISTORIC EMPIRE AND BENSON LAKE MINES ON NORTHERN VANCOUVER ISLAND

Adam Travis, Coast Copper Corp.; Wade Barnes, Coast Copper Corp.

The Empire Mine Property covers 22 mineral occurrences, including three past producing open pit and two past producing underground mines for magnetite, copper, gold and silver within skarn deposits. Coast Copper has an option to acquire a 100% interest in the Property.

In 2008, a M&I Resources was completed by Gary Giroux on the Merry-Widow-pit of 960 000 tonnes of 2.03 g/t Au, 5.64 g/t Ag, 0.34% Cu, 0.013% Co and 16.1% Fe (at a 0.50 g/t gold cut off). This resource was noted as being open at depth.

Since acquiring, Coast Copper has compiled >100 years of exploration work, completed surface exploration programs, conducted IP surveys and completed an initial drill program. Work has highlighted that significant potential in areas outside the main historical mined areas .

On December 1, 2021, Coast Copper announced it has commenced its 3500 m drill program following up on multiple previously identified targets including:

- Merry Widow Pit: Drilling down dip and to the north and south of the historical resource. This includes infill drilling to test gaps.
- Copper Knob: Testing mapped magnetite-skarn and pyrrhotite-skarn with copper mineralization. Coast Copper completed channel sampling with results: 9.77g/t Au and 2.35% Cu across 10.5m.
- Raven Pit: Drilling below the past producing Raven Pit, which extracted approx. 22,000 tonnes of magnetite ore (historical reports note they had to close because of too much copper and pyrite in the magnetite when they were specifically looking for magnetite).
- Benson Lake Mine - Old Sport Horizon: Ongoing surface IP Surveys and initial drill testing of Cominco Resources (1972) remaining reserve blocks (historical resource of 454 500 tonnes at 0.59 g/t Au and 1.3% Cu classified as M&I and a further 2 700 000 tonnes at 1.7% Cu (no Au grades estimated) classified as inferred) and possible areas on trend.

Resources historical in nature cannot be relied upon as the Company QP as defined under NI 43-101 has not prepared nor verified the resources.

ELEMENT 29 RESOURCES INC.

GEOLOGY AND EXPLORATION OF THE ELIDA PORPHYRY CU-MO DEPOSIT, PERU

Paul Johnston and Richard Osmond, Element 29 Resources Inc.; Manuel Montoya, Globetrotters Resource Group Inc.

The Elida porphyry copper-molybdenum project is in central Peru, approximately 85 km inland from the coast at elevations between 1,500 and 2,000 metres. An alteration anomaly recognised from methodically processed ASTER scenes was field-checked and staked in 2011. Field reconnaissance initiated by Globetrotters Resource Group in 2012 was immediately followed by geological mapping to resolve the scale of the hydrothermal system and establish the porphyry style mineralization. Drilling in 2014/15 completed under option by Lundin Mining intersected copper and molybdenum mineralization associated with a sequence of Eocene quartz feldspar porphyry intrusions. Following termination of the Lundin option, the project was moved into a new public company (Element 29 Resources Inc.) to fund continued exploration of the project, including a 4,500 metre drilling campaign completed in December 2021.

A cluster of individual porphyry centres exposed in outcrops or inferred from alteration patterns are contained within a 2.0 by 2.5 kilometre sericite-pyrite alteration zone. Drilling to date is focused on one of the porphyry centres, where copper and molybdenite mineralization form a halo around an elliptical, multi-phase quartz monzonite porphyry stock emplaced into a Cretaceous sedimentary and volcanic sequence. The remaining porphyry centres are untested by drilling. Chalcopyrite and molybdenite accompanied by pyrite, magnetite, and more localized pyrrhotite are contained in and around multiple episodes of quartz and sulfide veins associated with potassic alteration. Propylitic alteration (chlorite-epidote-pyrite) is developed outboard of potassic alteration. Sericite-pyrite or phyllic alteration overprints potassic and propylitic alteration and persists with variable intensity at depth. Geological interpretation continues to evolve as exploration progresses on this early-stage exploration project.

ENDURANCE GOLD CORPORATION

RELIANCE GOLD PROJECT – AN EMERGING "EPIZONAL" OROGENIC DISCOVERY REINVIGORATES BRITISH COLUMBIA'S MOST PRODUCTIVE GOLD CAMP.

Robert T. Boyd, Endurance Gold Corporation; Darren O'Brien, Endurance Gold Corporation

The Reliance Gold Property (the "Property") is located in the Bridge River Gold Camp in southwestern BC and 10 kilometres from the Bralorne-Pioneer Gold Mine Complex with over 4 million ounces of historic production.

The Property is host to an "Epizonal" Orogenic gold system within multiphase breccias and silicification with pyrite, stibnite and arsenopyrite. Gold mineralized zones are hosted within a series of ankerite-sericite-clay altered brittle shear structures. The Royal Shear, the largest shear discovered to date, is a complex compressional brittle-ductile shear with an alteration zone of about 150 metres in width and a 2 km strike length.

Between 1910 and the 1950s gold-bearing quartz-stibnite veins were explored with pits and short adits but there was no documented drilling until 1985. The Imperial Zone was discovered in a 1986 drill hole returning 7.01 g/t gold over 18.3 meters. Approximately 80% of the historic drilling occurred within 100 metres of this discovery hole between the years 1986 and 1988. Only sporadic exploration occurred on the Property between 1988 and 2008.

In 2020 Endurance acquired the Property and conducted the first systematic exploration program including channel sampling of pre-existing roadcut outcrops which lead to the discovery of the Eagle Zone. The most encouraging channel sample results returned gold composites of 5.80 g/t gold over 31.5 m including 9.69 g/t gold over 9.1 m, and 4.88 g/t gold over 23.5 m including 8.61 g/t gold over 9.1 m. Recent grab sampling and diamond drilling suggest that this Eagle Zone could extend for 400 meters near surface.

Endurance followed up these encouraging results with 51 shallow reverse-circulation (RC) drill holes where 41 of the drill holes returned significant gold intersections near surface. Highlight intersections include 14.08 g/t gold over 15.24 m, 10.50 g/t gold over 6.1 m, and 9.70 g/t gold over 12.2 m at the Eagle Zone, and 16.39 g/t gold over 4.57 m at the newly discovered Diplomat Zone.

Subsequently, a 22-hole diamond drilling program was completed in late 2021. Assay results have been received on 4 holes with highlight drill intersections from surface of 6.08 g/t gold over 10.9 m including 10.94 g/t gold over 5.4 m and 4.44 g/t gold over 19.0 m including 7.49 g/t gold over 9.0 m. Assay results are pending on the remaining 18 drill holes. Based on visual assessments, many of these remaining holes are expected to have gold intersections. These 2021 diamond drill intersections will be featured at the Core Shack.

Endurance intends to conduct a significant diamond drilling program in 2022.

ENDURO METALS: EXPLORING THE HEART OF THE GOLDEN TRIANGLE

Dylan Hunko, Enduro Metals

Enduro Metals is one of the leading exploration companies focused in the heart of British Columbia's prolific Golden at its Newmont Lake Property. Building on prior results, the company's geological team made several significant discoveries during its initial exploration programs in from 2019 to 2021.

Enduro Metals has outlined four distinct mineral systems on the Newmont Lake project. Each one of these mineral systems has unique characteristics, defining them by deposit type and metal endowment.

The Ridge Zone is characterized by Copper-Gold Alkalic Porphyry and related Skarn systems. The Ridge Zone has striking similarities to large-scale deposits in the region like Galore Creek. Limited drilling to date has returned: (BRDDH21-001) 331 m of 0.71% CuEq, including 146 m of 1.00% CuEq.

The McLymont Gold Corridor in defined by high grade Gold-Silver-Copper Epithermal Veins and Skarns that are directly related to the deep crustal structure known as the McLymont Fault. Drilling highlights from here include: (NW20-09) 8.85 m of 31.09 g/t Au and 1.07% Cu, (NW19-12) 44.13 m of 4.03 g/t Au and 0.29% Cu, and (R-08-07) 144 m of 3.18 g/t Au.

The CUBA system is outlined by a large 6km Silver in soil anomaly described as a combination of epithermal veins and carbonate replacement style systems. Surface chip samples from CUBA has returned values of: 2.4 m of 1,071 g/t Ag, 9.30% Zn and 2.00% Pb; and 4.8 m of 728 g/t Ag, 7.70% Zn and 6.20% Pb.

Chachi, a newly discovered area, generated high-grade samples of gold, silver, lead, zinc, nickel, and cobalt over a 9km x 4km area with associated Induced Polarization anomalies.

ESKAY MINING CORP.

ESKAY MINING CORP: A SCIENTIFIC APPROACH TO MINERAL EXPLORATION

John DeDecker, Eskay Mining Corp. and Colorado School of Mines

The Consolidated Eskay Property ("the Property" or "Project") comprises several Au-Ag Volcanogenic Massive Sulphide (VMS) targets located in the Golden Triangle, British Columbia.

The Property hosts several VMS targets, including the TV-Jeff, SIB-Lulu, C10, Vermillion, Scarlet Ridge, and Spearhead zones.

Results from comprehensive lithogeochemical sampling and detailed core logging of historic and new drill core has allowed for the synthesis a new model of the tectonic architecture of the Property. A picture has emerged of three anticlines, the central Eskay Anticline, the Eastern Anticline and the Western Anticline, wholly or partially underlying Eskay's Property. Major west-dipping ramp-type thrust faults are associated with each anticline.

TV and Jeff form a trend of Au and Ag-bearing VMS deposits on the eastern limb of the Eskay anticline; the C10 showing continues this trend to the south. The mineralized zones at TV are stratigraphically correlated with the Upper Mineralized Zone at Jeff. Sulphide and sulfosalt minerals invariably cross-cut primary magmatic and peperitic textures, consistent with subseafloor replacement- and feeder zone type mineralization proximal to a VMS hydrothermal upflow zone. Massive sulphide bodies occur at two stratigraphic levels, and are associated with asymmetric hydrothermal alteration of the stratigraphic footwall to the sulfide bodies. The presence of two massive sulfide bodies at distinct paleo-seafloor positions confirms that TV is a stacked VMS deposit, similar to those in the Noranda Camp, Quebec.

The property-wide BLEG survey completed in 2020, and SkyTEM survey completed in 2020-2021 identified several exploration targets. Field investigations of the highest priority targets (C10-Vermillion, and Scarlet Ridge) were conducted during the 2021 season. These investigations identified a sulfide-rich gossanous zone hosted by rhyolite extending ~1.5 km along the east limb of the Eastern anticline, and a lens of outcropping massive sulfide associated at Vermillion, both coincident with a cluster of very strong BLEG anomalies.

FILO MINING CORP.

FILO DEL SOL: REFOCUS ON EXPLORATION LEADS TO NEW DISCOVERIES

Bob Carmichael, Filo Mining Corp.; Diego Charchaflíe, Filo Mining Corp.

The Filo del Sol Project is located in San Juan Province, Argentina and Region III, Chile, 140 km southeast of Copiapó, Chile and 350 km northwest of San Juan, Argentina and is accessible by road from both cities.

Filo del Sol is a high-sulphidation epithermal copper-gold-silver deposit superimposed on a very large porphyry copper-gold system. Several different styles of mineralization occur, including structurally-controlled gold-silver and high-grade supergene-enriched copper within a broader envelope of disseminated and veinlet-hosted sulphide copper and gold mineralization. The mineralized system is associated with middle Miocene porphyry intrusions and overprinting high-sulphidation epithermal alteration within Permo-Triassic rhyolite and granitic basement rocks. The deposit is associated with an extremely large area of hydrothermal alteration, which extends over an area of 18 km^2 and trends along a regional north-easterly structure.

A Preliminary Feasibility Study completed in January 2019 evaluated mining the oxidized copper, gold and silver mineralization and extraction of the three metals through sequential heap leaching. Despite the compelling economics of this study, it was recognized that all drill holes terminated in sulphide mineralization and that the geological model was consistent with the continuation of the hypogene epithermal mineralization to depth along with the likely occurrence of porphyry Cu-Au mineralization. A decision was made to re-focus the project on continued exploration beneath the oxide resource.

FIREWEED ZINC

BOUNDARY ZONE WEST: A NEW DISCOVERY AT THE MACMILLAN PASS ZN-PB-AG PROJECT

Moira Cruickshanks, Fireweed Zinc; Jack Milton, Fireweed Zinc; Gilles Dessureau, Fireweed Zinc

Fireweed Zinc has been exploring and expanding the known extents of Zn-Pb-Ag mineralization at its Macmillan Pass project in Yukon since 2017. Initial work focused on the Tom and Jason deposits, and more recently has included exploration and drilling at Boundary Zone, approximately 15 km northwest of Jason. In 2020, Fireweed made a significant new discovery at Boundary Zone West, 350 m west of known Boundary Zone mineralization.

In 2021, a ten-hole step-out drill program at Boundary Zone West and Boundary Zone intersected zinc mineralization in every hole. This demonstrated that wide intervals of vein-hosted and massive sulphide mineralization exist at Boundary Zone West similar in style to Boundary Zone, as well as high-grade laminated sphalerite-galena mineralization similar to that at Tom and Jason.

Boundary Zone West hole NB21-002 intersected a new zone of finely laminated sphalerite-galena-pyrite mineralization grading 9.91% zinc, 1.64% lead, and 39.6 g/t silver over 32.99 m. This included a very high-grade zone of 23.77% zinc, 3.44% lead, and 75.7 g/t silver over 10.42 m, similar to stratiform mineralization in the high-grade parts of Tom and Jason.

Pink- to tan-coloured sphalerite and the presence of abundant fine-grained galena suggest that NB21-002 mineralization is proximal to a feeder structure, highlighting the potential to expand mineralization to depth, where red to brown sphalerite, higher grades, and additional massive sulphides may occur.

Core on display from NB21-002 includes 1. the new laminated zone, 2. a deeper high-grade massive-sulphide zone of 10.36% zinc, 0.94% lead, and 66.7 g/t silver over 40.08 m from a broader interval grading 8.22% zinc, 0.71% lead, 53.6 g/t silver over 60.68 m, and 3. a shallower zone of vein-hosted mineralization grading 9.99% zinc, 0.06% lead, and 17.4 g/t silver over 13.40 m from a broad zone grading 4.57% zinc, 0.02% lead, and 7.9 g/t silver over 40.24 m.

PERSEVERANCE PAYS OFF - GOLDEN SUMMIT PROJECT, ALASKA

Kristina Walcott, Freegold Ventures Limited; Alvin Jackson, Freegold Ventures Limited

Gold mineralization on the Golden Summit property occurs in three main forms, including 1) intrusive hosted sulfide-quartz stockwork veinlets (such as the Dolphin), 2) auriferous sulfide-quartz veins (exploited by historic underground mines), and 3) shear-hosted gold-bearing veinlets. All three types are considered to be part of a large-scale intrusive-related gold system on the property.

The Dolphin gold deposit is hosted in the Dolphin stock, which consists largely of granodiorite and tonalite, similar to the Pedro Dome pluton. It is the only large intrusive body known on the property at this time. The Dolphin stock is approximately the same age as the nearby Fort Knox pluton, which hosts Kinross Gold's Fort Knox gold mine. Freegold made the initial discovery of widespread low-grade gold mineralization in the Dolphin stock during the initial drilling campaign on the prospect in 1995; however resource definition drilling only commenced in 2011. In 2016 Freegold completed a prelimary economic assessment.

In 2019, following an extensive data review of past drilling and in conjunction with the resource model and block model level plans, Freegold identified what it believed to be the potential for a higher-grade corridor of mineralization extending from the area of the old Cleary Hill mine workings towards the Dolphin Intrusive. Based on this interpretation a drill program was initiated on the project in February 2020. Hole GSDL2001 was the initial test of this hypothesis and returned 188 metres grading 3.69 g/t Au.

Drilling remains ongoing on the project. Past drilling in the historic Cleary Hill area was largely shallow in nature and it is now interpreted that the Dolphin intrusive likely underlies the Cleary Hill area at depth

GREAT BEAR RESOURCES LTD.

CONTINUED SUCCESS AT FINDING HIGH GRADE GOLD ON THE DIXIE PROJECT.

R. Bob Singh P.Geo, VP Exploration; Andrea Diakow, P.Geo, VP Projects; James Irwin G.I.T., Exploration Geologist and Carly Smythe G.I.T., Exploration Geologist, Great Bear Resources Ltd.

Great Bear's 100% owned Dixie Project is a high grade, near surface gold discovery located 15 kilometres southeast of Red Lake, Ontario. The land package is over 22 kilometres in length and has undergone mineral exploration since the 1940s. Since acquisition by Great Bear in 2016, more than 325 000 m of drilling has been conducted, focusing on the Dixie Hinge, Limb, and LP Fault Zones.

The property is host to two unique styles of gold mineralization. The Hinge and Limb zones hosted in mafic volcanic rocks are orogenic quartz vein and replacement style systems similar to the Red Lake Mine setting. Gold in the LP Fault zone is hosted within felsic and metasedimentary rocks within a large-scale deformation zone containing both disseminated and high-grade zones.

1. Drilling in 2021 was focused on defining mineralization down to a vertical depth of 350 meters along 4.3 kilometres of continuous strike length on the LP Fault Zone.
2. Testing mineralization at depth with the current deepest intercepts being up to 800 metres vertical in all three zones.
3. Identifying additional regional targets.

Highlights from 2021 drilling include:

Midwest Zone: New Gold Zone west of Hinge and Limb zones: DL-071 20.27 g/t gold over 1.75 m, within 5.69 g/t gold over 7.05 m

Metallurgy: 95.2% to 99.2% gold Recoveries in Preliminary LP Fault metallurgical tests

Deep LP Fault: BR-385 157.00 g/t gold over 1.20 m within 11.01 g/t gold over 22.85 m from 678.75 m downhole

Shallow LP Fault: BR-238 29.17 g/t gold over 15.50 m from 41.8 m downhole at LP Fault

LP Fault Gold Zone: BR-394 28.18 g/t gold over 4.80m, within 3.83 g/t Gold Over 43.10m and BR-371 64.30 g/t gold over 0.55 m, within 5.90 g/t gold over 8.25 m

GOSSELIN DEPOSIT: A NEW DISCOVERY OF A LARGE AURIFEROUS HYDROTHERMAL SYSTEM IN THE CHESTER INTRUSIVE COMPLEX, SWAYZE GREENSTONE BELT, ONTARIO, CANADA.

Brad McKinley, P.Geo., Senior Geologist, IAMGOLD Corporation; Alan Smith, P.Geo., District Manager – Exploration, IAMGOLD Corporation

The Gosselin deposit is part of the Côté Gold 70:30 joint venture between IAMGOLD, as the operator, and Sumitomo Metal Mining Co., Ltd. The Côté Gold Project, located 175 kilometres north of Sudbury, Ontario and 125 kilometres southwest of Timmins, Ontario, is currently under construction with commercial production anticipated in the second half of 2023. The Gosselin deposit is a low-grade, large-tonnage Archean Au (-Cu) deposit discovered 1.5 kilometres northeast of the Côté Gold deposit. Both deposits are hosted by the Chester Intrusive Complex, a low-Al composite, subvolcanic tonalite - quartz diorite intrusion.

The Gosselin deposit was discovered in late 2017 following a campaign of geological mapping, mechanized stripping, and channel sampling which evaluated a high grade surface showing located 400 metres southeast of the zone. The discovery was a 'blind' discovery made by successfully tracking the high-grade veins with oriented drill core during initial drilling, modelling of the veins, and completing step-out drilling which intersected broad areas of low-grade Au enveloping the higher grade veins.

Delineation drilling following discovery culminated in an initial Mineral Resource estimate for the Gosselin deposit (on a 100% basis using a US$1500 per ounce gold price, and at a 0.3 g/t Au cut-off grade) totalling 124 500 000 tonnes of Indicated Resources averaging 0.84 grams of gold per tonne for 3 350 000 ounces and Inferred Resources totalling 72 900 000 tonnes averaging 0.73 grams of gold per tonne for 1 710 000 ounces (effective October 4, 2021).

Mineralization is hosted within a central hydrothermal breccia unit and in the enclosing tonalite/diorite wall rock. Alteration is characterized by pervasive sericite and silicification, with associated disseminated pyrite and chalcopyrite mineralization.

The Gosselin deposit remains open along strike to the northeast and has only been drilled to approximately half the depth of the Côté Gold deposit, so there remains significant potential for expansion.

IRVING RESOURCES INC.

IRVING RESOURCES' OMU EPITHERMAL GOLD-SILVER PROJECT, HOKKAIDO, JAPAN: AN EMERGING NEW HIGH-GRADE VEIN CAMP

Haruo Harada, Director and President, Irving GK; Takeshi Uemoto, Omu Project Manager, Irving Japan; Hidetoshi Takaoka, Technical Advisor and Chief Mining Engineer, Irving Japan; Quinton Hennigh, Director and Technical Advisor, Irving Resources Inc.

Located in Hokkaido, the Omu high-grade epithermal Au-Ag vein camp lies within a graben of early to mid-Miocene volcanic rocks of andesitic and rhyolitic composition. Three mineralizing centers have been identified by Irving: 1) a large terrace of siliceous sinter underlain by a network of high-grade precious metal veins at Omu Sinter; 2) an extensive network of high-grade precious metal veins at Omui, and; 3) a broad network of high-grade precious metal veins at Hokuryu. Limited historic mining took place at both Omui and Hokuryu immediately prior to WWII. Irving Resources has recently undertaken drilling at all three mineralizing centers resulting in discovery of numerous high-grade veins.

At Omui, two targets, Honpi and Nanko, have yielded numerous vein intercepts. At Honpi, hole 19OMI-010 encountered notable intercepts including 3.00 m grading 27.0 g/t Au and 40.5 g/t Ag, 1.10 m grading 29.6 g/t Au and 36.5 g/t Ag, 3.77 m grading 12.3 g/t Au and 84.5 g/t Ag, and 1.20 m grading 7.8 g/t Au and 887.5 g/t Ag. At Nanko, hole 20OMI-003 encountered two veins, one grading 8.15 g/t Au and 147.29 g/t Ag over 1.76 m within a broader intercept of 3.55 g/t Au and 69.24 g/t Ag over 14.24 m and a second vein grading 21.65 g/t Au and 538.75 g/t Ag over 1.72 m including 56.10 g/t Au and 1 435.00 g/t Ag over 0.60 m.

Omu Sinter has yielded notable vein intercepts including 1.33 m of 29.77 g/t Au and 575.7 g/t Ag including 0.32 m of 118.5 g/t Au and 1 410.0 g/t Ag in hole 19OMS-002, and 2.03 m of 12.92 g/t Au and 44.1 g/t Ag including 1.37 m of 17.80 g/t Au and 59.4 g/t Ag in hole 19OMS-005.

Drilling at Hokuryu in late 2021 encountered epithermal vein intercepts. Assays are awaited.

K92 MINING INC.

JUDD VEIN SYSTEM, KAINANTU GOLD MINE, EASTERN HIGHLANDS PROVINCE, PAPUA NEW GUINEA

Andrew Kohler, K92 Mining Inc.; Chris Muller, K92 Mining Inc.; Trotsky Benjamin, K92 Mining Inc.; David Medilek, K92 Mining Inc.

The Judd Vein System ("Judd") is located in the eastern Papua Mobile Belt of mainland Papua New Guinea and is part of K92's Kainantu Gold Mine. The Papuan Mobile Belt hosts a number of world class epithermal Au (e.g., Porgera) and porphyry Cu/Au (e.g, Ok Tedi, Frieda River, Wafi/Golpu) ore bodies. Judd has a known strike length of over 2.5 km, seen limited historical exploration and consists of four known veins based on limited drilling to date.

The best analogue to the system is K92's producing Kora Gold-Copper Deposit located ~150-200 m to the west. Kora is classified as an intrusion-related intermediate sulphidation quartz-sulphide gold-copper vein system, with an average vein thickness of 3-5m. Kora has a total measured and indicated resource of 1.1 Moz at 10.4 g/t gold equivalent ("AuEq") and inferred resource of 3.7 Moz AuEq at 9.0 g/t AuEq (effective date April 2, 2020) over ~1 km of drilled strike (+2.5km total known strike).

Judd saw limited exploration until 3Q 2020, where a ventilation infrastructure drive was opportunistically developed on the 1235 Level along the Judd Vein #1 ("J1 Vein"). This drive ultimately reported over a 360m strike an average J1 Vein thickness of 3.5m at 11.03 g/t AuEq (9.49 g/t Au, 0.94% Cu, 23 g/t Ag). Subsequently, the 1265 Level was developed (above 1235 Level), which recorded even higher grades, over a 294m strike an average J1 Vein thickness of 3.8m at 20.34 g/t AuEq (18.60 g/t Au, 1.03% Cu, 26 g/t Ag).

Judd drilling results have also delivered robust intersections at solid thickness, with 65% of holes exceeding +5g/t AuEq, 35% of holes exceeding +10g/t AuEq and 29% of holes exceeding +20g/t AuEq. In just over a year, K92 has translated exploration success into long hole stoping at Judd, which commenced in Q4 2021.

KARUS GOLD CORP.

FG GOLD PROJECT, CARIBOO REGION, BRITISH COLUMBIA, CANADA

Michael J. Tucker, P.Geol, VP Exploration, Karus Gold Corp.; Matthew J. Manor, Senior Exploration Geologist, Karus Gold Corp.; Andrew Kaip, President and CEO, Karus Gold Corp.

The Frasergold deposit (FG Gold Project) is located ~100 kilometres east of Williams Lake, British Columbia. Rocks that host the Frasergold deposit are predominantly black ("knotted") phyllites of the Middle Triassic Slocan Group (Quesnel Terrane). These rocks form the northeast limb of the northwest-trending Eureka Syncline, which is situated southwest of the Eureka thrust fault; this fault represents the suture between sedimentary and volcanic rocks of the Middle-Upper Triassic Quesnel Terrane and Devonian and older rocks of ancestral North America. Gold mineralization in the Frasergold deposit is contained in a quartz-carbonate-gold vein system and considered to be a sediment-hosted orogenic gold deposit ("SHOG" deposit).

Historical drilling was largely restricted to the top 100 m of the deposit area. Recent drilling in 2020 and 2021 by Karus Gold Corp. focused on identifying and extending the plunge of high-grade corridors down dip and along strike from historical extents of known mineralization.

2020 drill highlights include:

- FG-20-378 - 62.3 m of 1.7 g/t Au including 6.6 m of 9.7 g/t Au
- FG-20-382 – 42.2 m of 2.0 g/t Au including 10 m of 5.5 g/t Au
- FG-20-383 – 48.2 m of 2.0 g/t Au including 4.5 m of 7.7 g/t Au

Exploration efforts continue to unravel the complex structural controls on gold mineralization with the goal of applying a new, structurally guided exploration model to the ~6+ km of known mineralized strike extent of the FG Gold Project.

KENORLAND MINERALS LTD.

REGNAULT HIGH GRADE GOLD DEPOSIT - AN ARCHEAN INTRUSIVE HOSTED OROGENIC VEIN SYSTEM

Zach Flood, President and CEO, Kenorland Minerals; Dave Stevenson, Chief Geophysicist, Kenorland Minerals; Carl Gutsche, Director of Communications, Kenorland Minerals

In May of 2020 Kenorland Minerals Ltd. made a significant greenfields gold discovery, named 'Regnault', within their Frotet Project, located within the James Bay region of northern Quebec. The project encompasses a significant portion of the Archean, Frotet-Evans Greenstone Belt, approximately 100 kilometers north of the town of Chibougamau. Kenorland initially identified the Regnault target area following two years of systematic glacial till sampling beginning with a property-wide survey in 2018. Follow-up detailed till sampling and boulder prospecting defined a robust geochemical dispersion plume with strongly elevated gold in till and boulder samples. The initial drill program targeted zones of geophysical anomalism, including IP chargeability and remanent magnetization. The second drill hole of the maiden drill program, 20RDD002, intercepted visible gold in quartz veining along an intrusive contact between phases of dioritic rocks. The seventh drill hole of the program, 20RDD007, later to be declared the Regnault Discovery Hole, intersected 29.08 m of 8.47 g/t Au, including 11.13 m at 18.43 g/t Au in shear hosted quartz veining also within diorite. To date, a total of 34 197 m have been drilled at the Regnault discovery as Kenorland continues to define structural and lithological controls on mineralization. Kenorland's display at AME's Core Shack proudly displays drill core from high grade intercepts of the Regnault gold system along with maps and information on the regional context of the Regnault system.

KINGFISHER METALS CORP.

GOLDRANGE PROJECT: AN EMERGING OROGENIC AU DISTRICT ALONG THE YALAKOM FAULT NETWORK

Gayle Febbo, MSc., Kingfisher Metals Corp.; Dustin Perry, P.Geo, Kingfisher Meta,ls Corp.; Paul Stewart, MSc., Kingfisher Metals Corp.

Located in southwestern BC, the Yalakom fault network lies on the eastern margin of the Coast Belt and parallels numerous gold vein deposits including the past-producing Bralorne mine (4.2 M oz @ 17.7 g/t Au) in the Gold Bridge district. Gold mineralization at Gold Bridge spans a period of 71 to 64 Ma, which is contemporaneous with emplacement of the Bendor plutonic suite. Orogenic gold emplacement along the Yalakom fault network overlaps with the initiation of dextral strike-slip motion.

New mapping at the Goldrange Project, located ~140 km NW of the Gold Bridge district, has identified mesozonal to epizonal orogenic gold veins across the 367 km^2 of the NW-striking gold trend. Structural mapping indicates gold vein emplacement overlaps with movement on dextral and dextral-reverse faults along the southwestern margin of the Yalakom fault network. Gold veins within the Goldrange Project cut the Bendor plutonic suite providing an important lower limit to mineralization age (68.2 ± 0.2 Ma; Enchanted Valley pluton), similar to the Gold Bridge district. Veins in the Gold Bridge and Goldrange districts zone from Au-rich in the southwest regions to Sb-rich in the northeast. Brittle sulfide-rich As, Ag, Cu, Bi, Sb and Te enriched gold mineralization predominates in the northeast in contrast to ductile quartz-rich, sulfide-poor veins in the southwest. The timing constraints for mineralization, the overlap with dextral strike-slip faults, and vein zonation patterns indicate the potential for significant mesozonal and epizonal gold deposits at Goldrange.

The Cloud Drifter Trend at Goldrange was drilled for the first time in 2021. Initial drilling intercepted near surface Au-bearing veins and a sulfide-cement breccia including assays up to 6.88 g/t Au, 13.60 g/t Ag and 0.28% Cu over 9 m. These results position Goldrange as an important emerging orogenic gold district within the Yalakom fault network.

MPD PROJECT: GATE ZONE – EXPANDING A SIGNIFICANT NEW COPPER-GOLD PORPHYRY DISCOVERY IN SOUTHERN BC.

Jeff Ward, Kodiak Copper Corp.; Andrew Berry, Kodiak Copper Corp.

The MPD Project is located in South-Central British Columbia, 40 km south of Merritt and 25 km north of Princeton. Kodiak Copper Corp. initially acquired the property in 2018 and since then, has expanded the land package to 14 716 hectares, consolidating four historic prospect areas into a single project for the first time (Man, Prime, Dillard and Axe).

The MPD Project lies within the southern portion of the geological Quesnel Terrane, British Columbia's primary copper-producing belt that hosts nearby mines such as the world-class Highland Valley mine, New Afton and the Copper Mountain mine. Late Triassic-Early Jurassic alkalic and calc-alkalic island-arc volcanics and co-magmatic intrusives of the Nicola Group underlie most of the property. Copper-gold mineralization at MPD is hosted by northly trending, steeply dipping, altered dioritic rocks, phyric volcanics and late-stage structurally controlled veining.

The Gate Zone was discovered in 2019 by a single drill hole which tested the north end of a one kilometre copper-in-soil anomaly. Additional drilling in 2020 further revealed a high-grade copper-gold zone within a wider mineralized envelope of significant size, including a 282 metre intercept with 0.70% copper and 0.49 grams/tonne gold, the highest grades reported from 50 years of historic work the property.

Exploration by Kodiak in 2021 focused on expanding the significant copper-gold mineralization at Gate with systematic drilling. Step-out holes successfully extended copper-gold mineralization to include 950 metres of strike (north-south) and 350 metres in width (east-west) and down to 850 metres, being open in most directions. The 2021 drill campaign totalled 21 675 metres in 36 holes.

The Gate Zone demonstrates excellent potential for further discovery of significant copper-gold zones at MPD, which is typical of other multi-centre copper porphyry deposits in British Columbia. In addition to Gate, future work will test high-priority targets such as Man, Dillard, Dillard East and Axe.

LION ONE METALS LIMITED

TUVATU ALKALINE GOLD DEPOSIT, VITI LEVU, FIJI

Sergio Cattalani, Sr. V.P. Exploration, Lion One Metals Limited

The Tuvatu deposit, located on the island of Viti Levu, Fiji, is a high-grade epithermal Au deposit of alkaline affinity. Tuvatu is hosted primarily by the Navilawa multi-phase monzonite stock of Pliocene age (4.9 ± 0.1 Ma, McDougall, 1963) that intrudes the Sabeto shoshonitic volcanic sequence of similar age. Tuvatu, currently Fiji's second largest Au deposit, is located within the ~6km diameter Navilawa caldera, approximately 45 km from Fiji's Vatukoula (f. Emperor) gold deposit (~11Moz Au, Ahmad et al., 1987), which is associated with the larger and contemporaneous Tavua volcanic caldera (Colley and Flint, 1995).

Tuvatu's current mineral resource at a 3.0 g/t Au cutoff is 1,007,000 t at 8.48 g/t Au for 274,600 oz Au Indicated, and 1,325,000 t at 9.0 g/t Au for 384,000 oz Au Inferred (Mining Associates Pty., 2015; Tetra Tech, 2020). This resource statement is exclusive of ~30 000 m of additional diamond drilling completed since the end of 2017.

Tuvatu mineralization forms a relatively small footprint in plan, consisting of a series of narrow, structurally-controlled subvertical N-S and NNE-SSW trending veins, and EW-trending, shallow S-dipping quartz±carbonate veins, presumed to have developed during an episode of NE-SW shearing (Scherbarth and Spry, 2006). High-grade Au mineralisation is known to extend vertically for over 1100 m, a characteristic that is common to other large alkaline epithermal Au deposits elsewhere (Jensen and Barton, 2000).

Current exploration drilling at Tuvatu consists of: 1) shallow resource infill drilling from surface and underground aimed at upgrading portions of the current resource, and 2) deep exploration drilling from surface and underground targeting lode extensions and high-grade feeders under the Tuvatu resource. A recently identified, deeper and considerably higher-grade composite lode (500 Zone) is interpreted as a likely root feeder zone to the Tuvatu resource. This high-grade zone remains open in all directions.

DOUAY-JOUTEL DISTRICT: SYNVOLCANIC, INTRUSIVE-RELATED AND OROGENIC GOLD SYSTEMS WITHIN THE PROLIFIC ABITIBI GREENSTONE BELT'S CASA BERARDI DEFORMATION ZONE

Fred Speidel, Maria Sokolov, Even Stavre and Kiran Patankar, Maple Gold Mines

Located within Québec's Abitibi Greenstone Belt, one of the world's richest gold regions, the Joutel area was first systematically explored in the early 1960s, following the discovery of the Joutel and Poirier VMS deposits in the late 1950s. The Eagle deposit was discovered in 1962 by drilling combined electromagnetic and magnetic anomalies. Production commenced at the Joutel Mining Complex in 1974 and continued until 1993, with approximately 1.1 million ounces of gold produced at an average grade of 6.5 g/t from three separate operations (the Eagle, Telbel and Eagle West mines). Later exploration in the Douay area, about 20 km to the ENE, resulted in the discovery of the Douay Main Zone in 1976, also by drilling combined magnetic and electromagnetic anomalies. However, the style of mineralization at Douay is quite different from that at Joutel (Eagle-Telbel). Further drilling in the Douay area resulted in the discovery of several additional zones at Douay, of which the original Main Zone is now a minor component, as well as an established gold resource that holds significant expansion potential. Geologic mapping, sampling, geophysical surveying and drilling is ongoing at Douay, and will be re-initiated in the Joutel area in early 2022.

The current Douay resource area straddles the Casa Berardi North fault, whereas the Joutel area deposits are found within the Harricana Deformation Zone, or Casa Berardi South fault. The Casa Berardi Deformation Zone widens significantly in the Douay-Joutel district, and also bends from an EW to a more NW-SE orientation. Styles of gold mineralization are quite varied, with the bulk of the current Douay resources associated with a polyphase alkaline intrusive complex (syenitic-monzonitic-carbonatitic), with a likely structurally-controlled orogenic gold overprint (visible gold associated with quartz-carbonate veinlets, sediment-hosted sericite-quartz-Fe-Carbonate-pyrite shear zones and structurally-controlled, basalt-hosted Fe-Carbonate-magnetite-sericite-hematite-pyrite zones). At Douay, sulfides are typically disseminated or in veinlets, with typical sulfide contents of 0.5-2%, locally over 10%.

In the Joutel area, broadly stratiform and stratabound gold mineralization is typically associated with semi-massive to massive sulfides (15-70%) at a felsic pyroclastic to epiclastic sedimentary contact, with variable but significant Fe-carbonate and quartz veinlets and veins. However, similar alteration and mineralization is also found in microgabbro sills. Given the geological context, an orogenic overprint at Joutel cannot be ruled out.

NEW FOUND GOLD CORP.

KEATS ZONE: NEW FOUND GOLD IN NEWFOUNDLAND

Melissa Render, VP of Exploration, New Found Gold Corporation; Miguel Nassif, Senior Structural Geologist, New Found Gold Corporation

New Found Gold Corporation is a Canadian junior company exploring numerous high-grade orogenic lode gold prospects in the central Newfoundland gold belt. The Queensway project is a district-scale exploration play striking over 100 km and covers an area of 151 025 ha. In addition to the discoveries made to date, including the Keats, Golden Joint, and Lotto zones, the district boasts numerous gold showings and tens of kilometres of untested strike length.

The project lies within the Exploits Subzone of the Dunnage Zone which is comprised of a fold-thrust sequence of Ordovician turbiditic rocks of the Davidsville Group. The property is transected by two prominent regional-scale structures, the Appleton fault zone and the JBP fault zone that formed during orogenesis related to the closing of the Iapetus and Rheic oceans. Gold mineralization occurs in a variety of quartz vein styles that occupy secondary faults that form a network adjacent to the regional structures.

The Keats Zone was discovered during the 2019 inaugural diamond drill program by the first hole which intersected the SW-plunging domain of bonanza grade gold. This unique feature of the Keats Zone is controlled by high-dilation breccia segments that occur along the second-order Keats-Baseline fault zone. Gold mineralization at the Keats Zone is hosted in quartz-dominant breccias and vein arrays related to the Keats-Baseline fault which transects the NNE-trending subvertical stratigraphy. Within this fault zone, quartz vein textures including brecciated, vuggy and stylolitic record a complex history of vein formation and incremental growth. The system shows a Au-As-Sb-W metal association where high-grade quartz-bearing lodes contain coarse grained gold particles, arsenopyrite, chalcopyrite, boulangerite, Fe-carbonate and NH4 muscovite.

With continued drilling and the collection of critical datasets including oriented down-hole images, spectral, geophysical and geochemical, the Keats Zone's litho-structural framework has started to take form. Understanding the relationship between the high-grade gold mineralization, host stratigraphy and structure will be important for strategizing ongoing exploration efforts.

2021 NICKEL SHÄW EXPLORATION PROGRAM – FOCUS ON THE ARCH TARGET

Cam Bell, Nickel Creek Platinum Corp.

The 2021 Nickel Shäw (Yukon Territory) exploration program comprised 12 holes totalling 1257 m, of which nine holes totalling 974 m were drilled from two separate drill platforms on the Arch Target. Five of the six holes from the first platform hit massive sulphide intervals, and a second platform was constructed approximately 100 m to the west following the trend of mineralization. Of the three holes drilled from the second platform, one hit massive sulphide mineralization with one of the holes drilled deep into the hanging wall for borehole electromagnetic (EM) surveying. Massive to semi-massive sulphide intersections up to 3.85% Ni, 1.37% Cu and 3.97 g/t total precious metals (TPM) over 3.45 m were returned. Disseminated sulphide along with net-textured, blebby and interstitial sulphide variably occurs above the high-grade zones with combined massive sulphide and disseminated intervals grading up to 1.41% Ni, 0.55% Cu and 2.49 g/t TPM over 11.95 m. The mineralization is near-surface at depths of 3 to 70 m.

Sulphide mineralization at Arch occurs at the base of an outcropping ultramafic sill (“Arch Sill”) that is centred four kilometres west-northwest of the Wellgreen deposit. The sill is approximately 100 metres thick and dips subparallel to the slope at 55-75 degrees to the south-southwest. Massive and semi-massive sulphide mineralization is related to a thin (<2 m) marginal gabbro unit that lies below a distinctive Mottled Peridotite unit. The high-grade sulphide is developed at the marginal gabbro/footwall contact. Footwall rocks typically consist of Hasen Creek Formation meta-sediments. The ultramafic Arch Sill is believed to be contemporaneous with the Permo-Triassic ultramafic intrusion hosting the Wellgreen deposit.

Surface and borehole EM surveys were conducted concurrently with the 2021 drilling program and included four boreholes and three surface lines around the Arch Target. Borehole electromagnetic surveys defined a 100-metre-long conductor centred down-dip and down-plunge of 2021 drill intersections.

NORTHWEST COPPER CORPORATION

HIGH-GRADE CU-AU MINERALIZATION IN THE KWANIKA PORPHYRY DEPOSIT, NORTH-CENTRAL BRITISH COLUMBIA

Tyler Caswell, Kyle Dziama, Ian Neill, and James Lang, NorthWest Copper Corporation

The Central Zone of the Kwanika porphyry Cu-Au deposit was a blind drilling discovery in 2006. It formed at ~198-200 Ma in the northern Quesnel Terrane, and is hosted primarily by pre-mineral quartz diorite and quartz monzodiorite intrusions, and by possible syn-mineral quartz monzonite, that are related to the Hogem Batholith. Additional mineralization is hosted by mafic volcanic rocks of the Late Triassic Takla Group. Mineralization is truncated to the west by the Pinchi Fault and occurs along and to the east and west of the Central fault, which has an uncertain displacement history. The slightly younger (~195 Ma) Kwanika South Zone is located just southeast of the Central Zone but the two deposits have different features and their relationship is unknown.

The Central Zone is distinguished by three styles of high-grade Cu-Au mineralization (>1.5% CuEq). A mostly thin zone of paleo-supergene mineralization, highly unusual for a BC porphyry, is preserved below barren, Early Cretaceous sedimentary rocks. The most common high-grade style manifests intersections of high-density, variably deformed quartz-sulphide veins (e.g., 235 m grading 2.92% CuEq). An extremely high-grade breccia (e.g., 9.4 m grading 33.6% CuEq) of uncertain size and orientation has a matrix of chalcocite, bornite and covellite, that encloses fragments of potassically-altered intrusion and quartz-sulphide veins. The latter two styles are spatially related which, along with the generally tabular geometry to high-grade mineralization, suggests an intimate structural control. Similarities in geology, hydrothermal features, metals, and structural control between the high-grade Ridgeway Au-Cu Mine and the Central Zone suggest that the Kwanika property has considerable discovery potential for concealed, high-grade mineralization. The Stardust deposit is located only seven kilometers from the Central Zone and contains a high-grade resource of semi-massive, carbonate replacement Cu-Au mineralization that has potential for joint development with Kwanika.

GOLD IN IRON FORMATION – THE BACK RIVER PROJECT

Nicole Lasanen, Resource & Exploration Data Manager, Sabina Gold & Silver; Angus Campbell, Vice President Exploration, Sabina Gold & Silver

The Back River Project in Nunavut, Canada, is host to a > 9.0 M oz iron formation hosted gold district located in the Kitikmeot region of Nunavut, approximately 520 km northeast of Yellowknife, Northwest Territories and is 100% owned by Sabina Gold & Silver Corp. Current development plans are focused at the Goose project where recent discovery success of the Nuvuyak deposit, expansion of the Llama deposit and high grade drilling results from the Umwelt underground V2 zone have clearly demonstrated the potential for significant resource growth.

The district is comprised of numerous gold deposits hosted within banded iron formations occurring in folded turbiditic meta-sediments of the Beechey Lake Group within the Archean Slave craton. Twelve deposits have been defined to date, with the majority occurring at the Goose Site within D1 antiforms and synforms of a doubly plunging D2 synclinorium.

Stratigraphy across the Goose Site is consistent across all deposits, comprised of, from youngest to oldest: clastic sediments (GWKY) containing subordinate iron formation (DIF), the lower iron formation (LIF), the middle mudstone (MM), the upper iron formation (UIF), and the upper clastic sediments (GWKY). This sequence is cut by quartz-feldspar porphyry dykes (QFP) and later gabbroid dykes (GAB).

The main gold host, the LIF is comprised of alternating bands of magnetite, chert and amphiboles, averaging 1cm in thickness each, totaling package thicknesses of 5m to 8m typically. In the deposit areas the iron formation is thickened by folding 3 to 5 times, with thicknesses in fold hinges of greater than 50m. The QFP dykes intersect the LIF typically as axial plane parallel features which occur in close proximity to, or as markers to high grade gold structures.

Gold mineralization is largely marked by emplacement of arsenopyrite, pyrrhotite and pyrite, with higher gold grades typically associated with higher sulphide content and larger arsenopyrite crystal habit.

SCOTTIE RESOURCES

STEADILY ADVANCING THE SCOTTIE GOLD MINE PROJECT

Thomas Mumford, Ph.D, P.Geo, VP Exploration, Scottie Resources

Mineralization at the Scottie Gold Mine property primarily consists of a series of parallel, steeply dipping, NW- to W-trending, pyrrhotite-pyrite dominant shear veins. The 100% owned Scottie Gold Mine operated from 1981 to 1985 with milled vein material averaging 16.2 g/t gold and produced 95 426 ounces of gold from just 183 147 tonnes of mineralization. Mine production was principally from one vein (the M-zone), however numerous parallel veins were identified proximal to the mine and were set for production prior to shut-down.

Aggressive consolidation during the past 4 years has allowed Scottie Resources to build a contiguous land package that surrounds the historic high-grade Scottie Gold Mine, consisting of a total of 8,750 ha. The new land package, coupled with extreme glacial retreat that has occurred since mine operation, has allowed Scottie to test a new property scale mineralization model. This model has been substantiated by drill programs in 2019 and 2020, which indicate that the gold bearing system that hosts the historic mine extends kilometres beyond what was originally envisaged, and occurs as both high-grade veins and wide distributed zones.

The Scottie Gold Mine Project consists of three principal targets: historic Scottie Gold Mine, Blueberry Zone, and Domino, and a total of 12 500 m of drilling was done to advance all three targets during 2021. The 2019 discovery of the high-grade Domino Zone – located on strike, 2 km west of the historic mine – demonstrated that the mineralization in the Scottie Gold Mine property is primarily structurally controlled, extending across a major contact between andesitic and rhyolitic host rocks. Recent drilling at the Blueberry Zone has produced broad intervals of near surface, moderate to high-grade mineralization (e.g. 7.44 g/t gold over 34.78 m), presenting a compelling open pit target. Drilling during 2021 has successfully increased the strike length of the Blueberry Zone to more than 650 m.

SKEENA RESOURCES LIMITED

ESKAY CREEK: EXPLORING A UNIQUE, HIGH-GRADE GOLD-SILVER VHMS

Adrian Newton, Director of Exploration, Skeena Resources Limited; Rafael Vaudrin, Senior Project Geologist, Skeena Resources Limited

Situated in the Northern Cordillera of British Columbia's Golden Triangle, Skeena Resources' Eskay Creek Project is regarded as one of the highest grade, precious metal Volcanic Hosted Massive Sulphide (VHMS) deposits globally. Skeena's current open-pit gold-silver reserves at Eskay Creek are 2.53 Moz at 5.81 g/t AuEq of Proven reserves and 1.35 Moz at 3.26 g/t AuEq of Probable reserves for a total of 3.88 Moz at 4.57 g/t AuEq. The deposits at Eskay Creek are regionally situated in a package of Upper Triassic to Middle Jurassic volcanic and sedimentary lithologies of the Stuhini and Hazelton groups. Precious and base metal mineralization is heterogeneously distributed throughout three well defined lithologies at Eskay Creek; a massive to flow-banded brecciated rhyolite package, a transitional rhyolite-mudstone breccia that grades into carbonaceous laminated black mudstone and an andesitic flow and sill complex with minor interflow sediments.

In 2021, Skeena started a property-scale exploration program designed to demonstrate the significant exploration potential that remains at Eskay Creek. In a grass roots approach, selective re-logging and stratigraphic analysis were completed, which aimed to reconstruct the evolution of the Eskay "rift" basin. Systematic mapping, soil sampling and the collection of 2700 surface rock samples led to in the generation of 12 high probability, near surface target areas that were systematically ranked and are currently in the drill testing phase. The targets include synvolcanic structures and structural corridors parallel to, and extending past the established reserves along the Eskay trend, both laterally and stratigraphically.

Attendees will be looking at exemplary sections of core in mineralized zones from recent infill drilling in the main deposit as well as exploration drilling performed at the Eskay Creek project.

SNOWLINE GOLD CORP.

JUPITER: AN EPIZONAL OROGENIC GOLD DISCOVERY IN THE YUKON'S SELWYN BASIN

Scott Berdahl, CEO & Director, Snowline Gold Corp., Craig Hart, Chair, Snowline Gold Corp.

The district-scale Einarson project covers a Neoproterozoic to Cambrian sequence of passive margin clastic and carbonate rocks within and near the structurally complex eastern margin of Yukon's Selwyn Basin. Focused exploration in 2010 began to assess the region's potential for Carlin-style gold mineralization despite the lack of records of previous boots-on-the-ground gold exploration. Snowline Gold Corp. formed and acquired the Einarson project in 2021 to focus on regional gold discovery opportunities for Carlin-type, intrusion-related and vein-type gold deposits. Recent exploration identified a series of auriferous quartz vein float boulder trains, emphasizing the opportunity of this latter mineralization style.

In 2021, Snowline drill-tested and discovered the in-situ Jupiter vein system with a 4,300 m program. Jupiter is a blind target expressed as float boulders and a 3-km-long gold-in-soil anomaly. Drilling has so far discovered an extensive, mineralized system with intersections up to 13.2 g/t Au over 6.5 m (J-21-011), along a 1.1-km-long region that is up to 200 m wide. The veins are in a structural corridor of highly deformed, latest Neoproterozoic Narchilla formation sedimentary rocks. The host siltstones are relatively unmetamorphosed but are altered and have variably mineralized halos locally with zones of quartz flooding.

The vein system has several cross-cutting vein phases and typically yields multiple mineralized intersections per hole. The veins are quartz and carbonates with a range of textures. Mineralization has high Au:Ag ratios, is typically associated with acicular arsenopyrite and pyrite and has trace amounts of visible gold, as observed in J-21-020. The veins are locally ribbon-textured with carbonaceous bands but also contain breccias and open space quartz textures. These, and other features indicate that the system is likely an orogenic vein system that was shallowly emplaced, thus is best characterized as an epizonal orogenic gold vein system, similar to recent discoveries in Newfoundland.

SUN SUMMIT MINERALS CORP.

MORE BANG FOR THE BUCK: THE BUCK PROPERTY IN NORTH-CENTRAL BRITISH COLUMBIA

Christopher Leslie, Geological Consultant, Technical Advisor, C.D.L. Geological Consulting; Sharyn Alexander, President, Sun Summit Minerals Corp.

The Buck Property covers an intermediate-sulfidation epithermal-related gold and silver system in central British Columbia. The property is located in a historic mining district with excellent nearby infrastructure that allows for year-round road-accessible exploration.

The Buck property is predominantly underlain by volcanic and volcaniclastic rocks of the regionally prospective Late Cretaceous Kasalka Group, host to other significant deposits such as Blackwater, Capoose and Newton. Since entering into an option deal in July 2019, Sun Summit has been actively exploring the property, completing several diamond drill programs (16 holes for 6 000 metres in 2020, and 50 holes for 17 500 metres in 2021), geochemical surveys (soil, silt, rock sampling), and geophysical surveys (IP and magnetics). The tenure package has been expanded and now covers over 33 000 ha (330 km^2) with many unexplored exploration targets.

The complex epithermal-related hydrothermal system at Buck produced three main styles of mineralization, including: 1) high-grade gold and silver associated with quartz + carbonate + pyrite + sphalerite veins and veinlets hosted in volcaniclastic rocks and sediments, 2) bulk-tonnage style gold, silver and zinc associated with disseminated and clotted sphalerite + pyrite hosted in dacitic lapilli tuffs, and 3) near-surface, sphalerite cemented hydrothermal breccias. These styles of mineralization are interpreted to be genetically related resulting from the focusing of epithermal-related fluids along northwest oriented structures and along the margins of porphyryitic dykes with early intra-mineral timing.

A high-grade gold discovery was made in late 2020 comprised of several intervals of vein-hosted gold and silver mineralization, which has since been confirmed with follow-up drilling. Highlights include 7.5 m of 10.19 g/t Au including 1.5 m of 49.6 g/t Au (BK20-012; discovery hole), and 4.0 m of 31.61 g/t Au including 0.5 m of 246 g/t Au (BK21-020).

Long, continuous zones of disseminated and breccia-hosted, bulk-tonnage style gold and silver mineralization has also been confirmed on the property. Intervals highlighted by 241 m of 0.69 g/t Au including 109 m of 1.07 g/t Au (BK21-017), and 409 m of 0.45 g/t Au including 87.1 m of 1.02 g/t Au (BK21-033) have been intersected.

Recent drilling in late 2021 was focused on investigating the extent and continuity of high-grade, vein-hosted gold mineralization, the strike-extent of near surface bulk-tonnage gold mineralization, and the limits of the mineralized hydrothermal footprint, which is unconstrained both vertically and laterally.

SURGE COPPER CORP.

SURGE COPPER'S OOTSA – BERG PROJECT, ADVANCED COPPER-MOLYBDENUM-GOLD DEPOSITS IN CENTRAL BRITISH COLUMBIA

Shane Ebert, Surge Copper Corp.

The 122 372 hectare Ootsa-Berg Property is located in westcentral British Columbia. The property contains 4 advanced polymetallic porphyry deposits along with multiple exploration targets that are being aggressively advanced and expanded by Surge Copper. The East Seel, West Seel, Ox, and Berg deposits collectively contain 834 million tonnes of measured and indicated resources. East and West Seel have recently seen over 44 000 metres of new drilling and a resource update is currently in progress.

The West Seel, East Seel and Ox deposits have been dated at 83 to 86.7 Ma and are associated with porphyritic intrusions of the Late Cretaceous Bulkley Suite. West Seel contains copper-gold-molybdenum-silver mineralization hosted in a variety of porphyritic intrusive rocks and in fine-grained clastic sedimentary rocks along intrusive margins. Mineralization is associated with quartz-pyrite-chalcopyrite-molybdenite-pyrrhotite veins associated with biotite-dominated potassic and sericite alteration. East Seel contains copper and gold mineralization associated with quartz-magnetite-chalcopyrite veins and potassium feldspar alteration, locally overprinted by a sericite-dominated assemblage, and is hosted within a coarse crowded feldspar-biotite porphyry with an aphanitic matrix. Immediately adjacent to the East and West Seel deposits is a zone of late-stage high-grade breccia hosted mineralization at the Seel Breccia Zone. The Seel Breccia Zone is characterized by variably brecciated and fractured host rocks with a matrix of quartz, iron-carbonate, pyrite, chalcopyrite and sphalerite.

The Berg Deposit is associated with a 50 Ma quartz monzonite intrusion with mineralization concentrated within the surrounding hornfelsed Hazelton Group volcanic rocks and older quartz diorite. Berg contains classic copper-molybdenum porphyry style mineralization with a strong superimposed secondary chalcocite enrichment blanket.

On display is core from three different zones; copper-gold-molybdenum-silver porphyry mineralization from West Seel, high grade copper-silver mineralization from Seel Breccia, and the secondary chalcocite enrichment blanket from Berg.

TALISKER RESOURCES LTD.

GOLDEN HORNET PROJECT: SOUTH-CENTRAL BC'S NEW LOOK AT INTRUSION RELATED DEPOSITS

Andrew Ganton and Raja Yarra, Talisker Resources Ltd.

The Golden Hornet project is an emerging intrusion related gold (IRG) deposit in south-central British Columbia, 35-kilometres north of Rock Creek. The area is host to several significant past gold producers which exhibit similar geologic characteristics to Golden Hornet such as the Rossland Gold Camp, Greenwood mining camp, Camp McKinney deposit and the Buckhorn Mountain deposit .

The project area is structurally situated within a horst, bound by the north trending Kettle River (east) and Crouse Creek (west) normal faults. The geology is characterized by a multiphase early Jurassic diorite to granodiorite intrusive suite intruding a stratified package of Paleozoic greenschist facies volcano-sedimentary rocks. Mineralization exposed on surface is hosted in high-grade northwest trending veins, tourmaline-chlorite breccias, and fault zones returning grades from 8-32 g/t Au. Enveloping these high-grade structures, are broad zones of low-grade gold mineralization associated with stockwork sulfide veinlets and fracture networks encompassing the contact aureole of the mineralizing intrusive units and into the host hornfels volcano-sedimentary sequence. A three-kilometre northwest trending gold in soil anomaly is coincident with the mapped contacts of a crowded-hornblende diorite and hornfels volcano-sedimentary sequence.

Talisker Resources completed a maiden 4850 metre diamond drilling program with 10 holes in the Main Hornet Zone and an additional 4 holes on a 700 metre step out in the Iron Sky Zone to the west. Drilling intercepted semi-massive sulfide mineralization and intervals of high-density sulfide fracture fills and stockwork sulfide veinlets in all drill holes.

With a reported 4.3 Moz of gold extracted from past producing IRG mines in south-central British Columbia and north-central Washington, the Intrusion Related Gold Belt warrants a modern systematic terrane scale investigation to fully realize the potential of a world-class mineral endowment.

TECTONIC METALS INC.

TIBBS GOLD PROJECT, GOODPASTER MINING DISTRICT, ALASKA

Eric Buitenhuis, VP Exploration, Tectonic Metals Inc.

Tibbs is located in the Goodpaster Mining District approximately 175 kilometres southeast of Fairbanks, Alaska, and 35 kilometres east of the Pogo Gold Mine. The project is accessible via helicopter and historic winter trails and hosts an unimproved airstrip in the Tibbs Creek drainage. The property covers 29 280 acres of highly prospective geology hosting over 25 target areas and historic lode gold production in three locations. The Tibbs property offers high-grade gold mineralization at surface, in trenches, and in drill core, all in proximity to existing infrastructure and an active mill.

Gold mineralization at the property is hosted in both intrusive and metamorphic rocks of the Yukon Tanana Terrane (YTT) and appears to be controlled by the district-scale Black Mountain Tectonic Zone, a northeast trending structural corridor. Three distinct styles of gold mineralization are observed at Tibbs:

1) Pogo-style high-grade gold-quartz veining at the Gray Lead prospect.

2) Intrusion-hosted disseminated sulphides and stockwork gold-quartz-stibnite-arsenopyrite veining at the Michigan and Upper/Lower Trench prospects; and

3) Fort Knox-style intrusion-hosted sheeted gold-quartz-bismuthenite veins at the Jorts and Hilltop prospects.

Tectonic has completed exploration work at the property over four campaigns beginning in 2017, with a gradual progression from grassroots methodologies such as geological mapping and power auger soil sampling, heli-portable excavator trenching, and airborne magnetic and electromagnetic geophysics through to RAB drilling campaigns in 2019 and 2020. Soil geochemical sampling in 2020 identified previously unknown, high tenor gold, arsenic, and bismuth soil anomalies west of previous exploration in similar host rocks as Pogo. Tectonic's 2021 program was the first core drilled since 2011 and the first oriented core in the property's history. The program was designed to obtain structural control on high grade mineralization, while also testing newly discovered exploration targets with similar structural, geological, and geochemical features as mineralization at Pogo.

PEDRA BRANCA PGE PROJECT: PGE DISTRICT IN BRAZIL

Jim Paterson, CEO; Colin Smith, VP of Exploration and Thiago Diniz, Exploration Manager, ValOre Metals Corp

The Pedra Branca Pd-Pt-Au (2PGE+Au) (± Rh, Ni, Cu, Cr, Co) deposits are hosted within the Paleoproterozoic mafic-ultramafic Troia Unit, located in Ceará State, Brazil. The mineralization comprises coarse- to medium-grained olivine-websterite, peridotite and dunite cumulates, and more evolved mafic units such as diorites, leucogabbros and tonalites. The ultramafic bodies are generally overlain by a sequence of amphibolitic rock interlayered with granitoids, with the footwall characterized by a diverse suite of generally well-layered gneisses, granitoid and amphibolites. Where observed, contacts of the ultramafic bodies with their host rocks are sheared, and the ultramafic bodies themselves are variably cut by altered shear zones. The ultramafic rocks were originally composed primarily of pyroxene and olivine, and while subsequent alteration has affected the mineralogy, primary cumulate textures are typically well preserved.

Gold and PGE mineralization at Pedra Branca is predominantly associated with areas of chromite enrichment within the ultramafic package of the Troia Unit, and localized occurrences of Base Metal Sulphide mineralization (pyrrhotite, chalcopyrite, pentlandite). The highest PGE grades (often >10 g/t 2PGE+Au) are associated with chromite-rich ultramafic rocks, and chromitite reef horizons, which can vary from 30 cm to 6 m thick.

Significant PGE mineralization discovered to date is identified in 5 distinct areas: Esbarro, Trapia, Cedro, Curiu and Santo Amaro. Together, they host an aggregate NI 43-101 inferred resource totalling 1 067 000 ounces of 2PGE+Au contained in 27.2 million tonnes grading 1.22 g/t 2PGE+Au. All the currently known Pedra Branca inferred PGE resources are potentially open pittable.

With a focus on resource expansion, target advancement and new discovery, ValOre's 2020 and 2021 drill programs – more than 17 000 m – have significantly extended PGE mineralization outside of the 2019 NI 43-101 Inferred Resource areas.

The potential is further supported by compelling historical geochemistry and geophysics, with excellent existing road access and power supply throughout.

VIZSLA SILVER CORP.

INTRODUCTION TO THE HIGH GRADE PANUCO SILVER DISTRICT

The Panuco (Panuco-Copala) project is a high grade silver and gold, intermediate sulphidation epithermal district with veins mapped over a fifteen by eight kilometre area. The project is located in southern Sinaloa, approximately one-hour east by road from the city of Mazatlán.

The project has been continually mined since the late 1500s and multiple mines and mills are currently operating within the district. Despite this long history of production, the fragmented ownership has restricted development with Vizsla Resources, in 2019, being the first company to consolidate the district under a single entity. As such, despite the advanced nature of the project it remains extremely poorly explored with no detailed property wide geological map and only drilling into two of the major vein corridors.

Vizsla Resources discovered the Napoleon Vein mid 2020 and the Tajitos vein in early 2021. The company has had considerable exploration success in 2021, drilling approximately 95 000 metres, defining mineralization over 1820 metres strike length by an average 300 metres of depth at the Napoleon vein and 1100 metres of strike length by 350 metres of depth at the Tajitos vein. During 2021, the company has also complete geophysical surveys that lead to the discovery of the Josephine structure and identified several other targets to further explore. The company is currently undertaking an aggressive exploration program at the property with ten drill rigs currently completing exploration and resource stage drilling.

SHOVELNOSE GOLD PROJECT

Peter Fischl, Exploration Manager, Westhaven Gold Corp.

The Shovelnose gold property lies within the Spences Bridge Gold Belt, a 110-km long belt of intermediate and felsic volcanics formed in a continental arc of mid-Cretaceous age. More recent exploration over last several decades has indicated the potential for significant low-sulphidation epithermal gold-silver deposits in this belt, which remains relatively under-explored.

Recent drilling has confirmed the presence of a robust epithermal gold-silver bearing vein system at Shovelnose. Three vein zones have now been defined (Vein Zones 1, 2, and 3) at the previously discovered South Zone. Resource-based drilling here over the last year continues to yield significant gold-silver mineralization. Highlights include 8.17 g/t Au and 34.64 g/t Ag over 41.55m (hole SNR21-04) and 4.22 g/t Au, and 46.42 g/t Ag over 51.77m (hole SNR21-01).

Exploration drilling has now extended the strike length of Vein Zone 1 beyond South Zone northwest to the Franz Target for a total of 4.3 km. It remains open northwest of the Franz Target. Drilling between Franz and South along a dilational jog in Vein Zone 1, 1.1 to 1.7 km northwest of South, has uncovered another zone of higher grade mineralization, the FMN Target. Highlights here are as follows:

- 9.15 g/t Au and 27.43 g/t Ag over 15.97 m (SN21-161, 220.32-236.29 m)
- 2.20 g/t Au and 5.88 g/t Ag over 22.05 m (SN21-167, 81.95-104.0 m)
- 31.7 g/t Au and 529.0 g/t Ag over 0.9 m (SN21-158, 139.74-140.64 m)

The previously mentioned resource-based drilling has confirmed continuity of three previously defined vein zones at the South Zone. In addition, intervening halos of lower grade disseminated mineralization have also been intersected in a shallow laterally extensive rhyolite tuff horizon, enhancing the potential for near surface bulk tonnage at South. These broader widths of vein and disseminated mineralization are highlighted as follows;

- 0.49 g/t Au and 1.84 g/t Ag over 265 m (SNR21-20, 38.00-303.00 m)
- 1.09 g/t Au and 2.43 g/t Ag over 85.45 m (SNR21-35, 42.00-127.45 m)

ABSTRACT GUIDE

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