ABSTRACT GUIDE 2023

AME ROUNDUP.

TECHNICAL AND TARGETED SESSIONS

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ABSTRACT GUIDE 2023

**Details in this volume are accurate at time of printing*

REGIONAL OVERVIEWS

MINERAL EXPLORATION AND MINING IN BRITISH COLUMBIA, 2022

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 2022 continued to be a major contributor to the provincial economy of British Columbia. Coal typically accounts for 50–60% of the production value, copper approximately 25–30% and gold approximately 10–15%. Coal production is almost exclusively metallurgical coal. Operations were not impacted by forest fires and flooding like in the previous year, and as such, the forecasted value of mineral production for 2022 will exceed 2021's value of C$13.9 billion. Although commodity prices for gold and copper declined from the first quarter to the third quarter of 2022, metallurgical coal prices were up 86% year on year by late November.

The British Columbia Geological Survey tracks the progress of approximately 400 mineral and coal exploration projects annually. The value of exploration expenditures had been increasing since 2019 and there was a large increase in 2021. Total expenditures in 2021 were C$660 million, an increase of C$237 million from 2020. For 2022, expenditures may decrease. Although the year started out positively, global unrest reduced financings and activity. The full impact is yet to be tabulated.

Mine construction began at Ascot Resources Ltd.'s Premier Gold project and site preparation began at Artemis Gold Inc.'s Blackwater Gold project. Both plan to start commercial production in 2024. Acquisitions continued to highlight the quality of BC projects and the province's attractiveness for investment. Newcrest Mining Limited completed its purchase of Pretium Resources Inc.'s Brucejack gold mine for approximately C$3.5 billion.

Several projects progressed through preliminary economic assessment, prefeasibility or feasibility stages. Some advanced projects are expected to complete up to 40 000 m of exploration drilling in 2022. The largest drill projects target gold, but there are also significant porphyry copper exploration projects active from grassroots through near-mine and mine expansion stages. Projects also targeted nickel, zinc, silver, rare earth elements, tungsten and metallurgical coal. Significant drill intersections and discoveries were reported at all stages of exploration. Reports of new discoveries and significant results continue for precious metals, base metals and other commodities, supporting British Columbia's reputation as a premier exploration and mining jurisdiction.

YUKON EXPLORATION OVERVIEW 2022

Scott Casselman, Head, Mineral Services, and Carolyn Relf, Director, Yukon Geological Survey

Regional Overviews
10:35 AM – 11:00 AM

Exploration activity in Yukon appears to be stabilizing following the pandemic, although a number of headwinds persisted over the year, including worker shortages, high fuel prices, supply chain issues and tough financial markets. Natural Resource Canada's revised spending intentions for 2022 totaled C$185 million this year; tracking of exploration and development spending by Yukon Geological Survey yields a similar number (C$188 million as of end of November 2022).

As in previous years, most exploration spending in Yukon targeted gold (> 60%), with copper (approximately 15%), lead/zinc (approximately 14%) and silver (approximately 8%) composing the next largest shares.

One of the highlights of early-stage exploration in 2022 was Snowline Gold Corp.'s discovery of a new reduced intrusion-related gold system on their Rogue property (Valley target). Several copper projects changed hands in 2022, signaling growing interest in energy metals as countries work to meet carbon emissions targets. Four advanced projects in Yukon continued through permitting in 2022, including the Coffee (Newmont Corporation), Kudz Ze Kayah (BMC Minerals) and Casino (Western Copper and Gold) projects.

On the mining front, Victoria Gold Corp.'s Eagle mine produced over 106,000 oz of gold in the first three quarters of the year and is on track to produce 165 000 oz by year end. Minto Metals Corp. saw an increase in output to the third quarter relative to 2021, producing 22.4 million pounds copper (up by 30%), 8972 oz gold (up by 26%) and 103 116 oz silver (up by 18%).

Alexco Resource Corp. produced 191 000 oz of silver, 313 000 lb of lead and 532 000 lb of zinc from their Keno mine during the first two quarters of 2022. In June, they temporarily suspended mining and milling to focus on underground development and stockpile enough ore to supply the mill at 400 tpd. In early September, Hecla Mining Company purchased Alexco; it is anticipated that they will resume production in the new year.

ALASKA'S MINERAL INDUSTRY ACTIVITY IN 2022

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

Regional Overviews
11:00 AM – 11:25 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 2022 exploration spending, including near-mine, development-stage and exploration projects, is at least US$310 million (about C$422 million), up significantly from 2021. At least 21 non-mine projects spent more than US$1 million (about C$1.36 million). In 2022, 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 145 placer mines. There were 10 advanced-exploration– and development-stage projects (5 with drill programs).

In 2022, 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) systems, volcanogenic and sediment-hosted Zn-Pb-Ag-Au-Ag massive sulphide districts, and graphite and nickel-copper-PGMs were also the focus of significant exploration interest. Alaska had at least 32 active early-stage exploration projects throughout the state. Drilling programs to advance exploration and development projects were carried out at the Aktigiruq-Anarraaq, Arctic, Donlin, Estelle, Golden Summit, Goodpaster/Central, Graphite Creek, Herbert Gold, Icy Cape, Johnson Tract, Lik (Su), Lucky Shot, Manh Choh, Northeast Fairbanks, Palmer, Seventymile, 64 North, Treasure Creek, Upper Kobuk and Waterpump Creek/Last Hurrah 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).

THEME SESSION: CRITICAL TO OUR FUTURE

CRITICAL QUESTIONS AND CHALLENGES FACING THE FUTURE OF GEOSCIENCE: AN INDUSTRY PERSPECTIVE

Andy Wurst, Global Chief Geologist. Barrick Gold Corporation

Theme Session: Critical to Our Future
2:00 PM – 2:25 PM

Geoscientists provide the fundamental geological and mineralogical datasets and interpretations that inform mineral exploration, mineral processing, environmental performance of active mines and mine closure. The demand for geoscientists is predicted to increase with increasing demand for mineral resources associated with the low-carbon energy transition and demand for improved environmental and social performance of the mining industry. In many countries, however, geoscience enrolments are decreasing and geoscience and mining engineering training programs in universities are being closed. This means that the future workforce that underpins the minerals industry is at risk. In this presentation, the importance and future of geoscience training will be discussed, and the future role of geoscientists in the minerals industry and what skills they require will be highlighted.

BHP XPLOR: ACCELERATING EXPLORATION OF CRITICAL RESOURCES

Libby Sharman, Technical Lead, and Sonia Scarselli, Vice President, BHP Xplor

Theme Session: Critical to Our Future
2:25 PM – 2:50 PM

Resources are fundamental to the way we live now and in the future. With the increased electrification of energy and transportation, the demand of commodities like copper will likely double in the next 30 years. Similarly, the demand for nickel will surge as the trend toward electric vehicles increases. The time is now, to accelerate the exploration of the resources we need, both now and into the future.

BHP introduces BHP Xplor, a cohort-based accelerator program to support early-stage mineral exploration start-ups finding critical resources, such as copper and nickel, to drive the energy transition. BHP Xplor offers candidates in-kind services, mentorship, networking opportunities with industry and investors and connections. BHP Xplor merges concepts from both venture-capital and early-stage accelerators to establish a fit-for-purpose exploration portfolio of innovative early-stage mineral exploration companies and helps drive their exploration campaigns.

We believe that building a better future is a responsibility we all share and that is why we are committed, through this program, to accelerating exploration of critical resources needed for the energy transition.

REGENERATION: RE-MINING FOR CRITICAL AND ECONOMIC MINERALS AND LAND RESTORATION

Stephen D'Esposito, Founder & Board President, and Nicholas Mitchell, Program Manager and Policy Analyst, Regeneration Enterprises

Theme Session: Critical to Our Future
2:50 PM – 3:15 PM

Regeneration is a public benefit start-up that creates biodiversity-, community- and climate-positive minerals from mining waste. We do this by producing responsibly sourced minerals for the energy transition, green tech and sustainable brands, while turning legacy, brownfield mine sites into environmental and community assets.

Regeneration is needed because the waste rock, tailings and wastewater at many legacy mine sites are often not commercially viable deposits using traditional business models. Using an innovative combination of re-mining, nature-based solutions including credits, closure liability reduction and other revenue streams, we are able to fund our public benefit purpose of restoring ecosystems and improving adverse environmental conditions that are left after mining.

Our sites include the legacy sites in the portfolio of our upstream partners, including Rio Tinto, as well as orphaned and abandoned sites held by governments. To build our site pipeline, Regeneration is scouting additional sites in the United States, Canada, Australia, Europe and other jurisdictions. We use a reverse-engineering exploratory technique, sampling, characterizing and mapping previously mined areas with lacking or absent geological data.

DEVELOPING BIOTECHNOLOGIES FOR TREATING ACID ROCK DRAINAGE

Vikramaditya Yadav, CEO and Co-Founder, Tersa Earth Innovations

Theme Session: Critical to Our Future
3:15 PM – 3:40 PM

Imagine a world in which everybody lives in carbon-neutral buildings that produce their own energy. Part of this energy powers an entirely electric transportation system that is pollution-free. These visions of a better future are the promise of a completely electric world.

Widespread adoption of electric vehicles could reduce carbon emissions from the transportation sector by nearly 50%; however, the manufacturing of a single electric vehicle generates 250 000 kg of mining waste and 150 000 L of

an extremely toxic liquid, acid rock drainage (ARD). Equally worse, ARD also contains significant waste metal. The total value of metals lost in ARD totals more than $20 billion each year in North America alone. Much of mining is wasteful and unsustainable and the industry is in desperate need of effective, carbon-negative solutions to treat its waste.

As innovators within the mining ecosystem, Tersa is harnessing nature's remarkable ability to break down and recycle waste in the cleanest and most efficient manner imaginable: by treating mining waste and recovering metals. Tersa uses a synthetic biology toolkit to identify the best remediation and cleanest metal extraction chemistries in the world and then uses its rich experience in process engineering to deploy the chemistry in a scalable manner. The 'secret sauce' is how Tersa marries both approaches—synthetic biology and process engineering—and the exclusive focus on mining and the expertise on building relationships. Tersa is developing a process train that includes arrays of microbial fuel cell assemblies for recovering metals lost in ARD and biological precipitation of calcite for neutralization. The objective is to bring in a carbon-negative technology for metal production and waste reduction that will be central to the realization of completely electrified society.

COMMODITIES AND FINANCIAL MARKETS

OUTLOOK FOR THE PRECIOUS METAL AND COMMODITY SECTORS

Tom Brady, Managing Director, Capitalight Research Inc.

Commodities and Financial Markets
9:05 AM – 9:30 AM

This presentation will review current trends in the gold, silver and wider commodity sectors. Key drivers and potential events will be discussed with market outlooks provided for 2023.

BATTERY METALS OUTLOOK: CAN ROBUST DEMAND INCENTIVIZE SUPPLY?

Mark Ferguson, Director, Metals & Mining Research, S&P Global Commodity Insights

Commodities and Financial Markets
9:30 AM – 10:00 AM

Amid deteriorating near-term macroeconomic conditions, the electric vehicle (EV) market is heading for slower but still steady growth in 2023. Global policies remain strongly in favour of the EV transition, especially as the sector provides relatively easy wins for direct emissions reduction; however, there are multiple headwinds denting the increase in sales volume in 2023, as purchase subsidies end in China and buyers in Europe and the United States find it more difficult to gather the upfront capital for EVs, which still command a premium over internal combustion engine vehicles.

Medium-term outlooks for EV sales, and the commensurate demand for key battery commodities, foreshadow prices at levels higher than historical norms. The exploration sector has responded with increasing budgets focused on lithium, cobalt and nickel, yet the supply pipeline required to meet surging demand remains uncertain and will

be challenged by various national and regional efforts to secure commodities from domestic sources or countries with aligned policies.

IN PURSUIT OF NOTHING: THE CARBON MARKETS

Christian Milau, CEO, Blue Dot Carbon Corp.

Commodities and Financial Markets
10:00 AM – 10:30 AM

It is no secret that the climate has been changing and carbon is an important factor influencing this change. From atmospheric rivers and wildfires in British Columbia to floods, droughts and wildfires in Australia to epic droughts across Africa and many other extreme weather and climate impacts around the world, it is clear that something is changing. Greenhouse gases and particularly carbon emissions are playing a big role in the atmosphere and in climate change.

Almost all countries in the world, and a growing number of companies, are committing to a reduction in carbon emissions over the next few decades. This is no longer optional and greenwashing is being called out. The focus on limiting temperature increases to 1.5°C by 2050 is ambitious and will require serious global cooperation, which is taking shape at the annual conference of the parties (COP) conferences and related negotiations each year.

The carbon markets will be an important part of the solution and have been around for several decades, but the momentum is growing for change as the world's largest capital pools and funds are demanding a net zero future. This private and public capital, supported by government frameworks and global cooperation, will gather massive momentum as we move toward 2050.

NEW GEOSCIENCE

GEOLOGY AND MINERALIZATION OF YUKON-TANANA TERRANE IN THE SOUTHERN BIG SALMON RANGE, YUKON

David Moynihan, Yukon Geological Survey, Whitehorse, Yukon; Jim Crowley, Boise State University, Boise Idaho; Patrick Sack, Yukon Geological Survey, Whitehorse, Yukon

New Geoscience
9:05 AM – 9:25 AM

The southern Big Salmon Range includes two contrasting fault-bounded domains: 1) a central region underlain by metabasaltic rocks with mostly MORB and E-MORB geochemical characteristics, in addition to marble and chert ('Semenof block') and 2) adjacent regions that include clastic metasedimentary rocks, lesser metavolcanic rocks and Early Mississippian metatonalite (Simpson Range suite). In the southern part of this domain, metasedimentary and metavolcanic rocks at high structural levels are intruded by metatonalite of the Simpson Range suite. These structurally overlie a contrasting succession of rocks that is dominated by metachert and siliceous argillite. This succession, which may be correlative with the Swift River Group of the Yukon–British Columbia border region, hosts manganese-rich mineralization (gem-quality rhodonite) at Evelyn Creek.

Pre-Jurassic rocks are penetratively deformed and underwent mostly greenschist facies metamorphism, whereas Early Jurassic and younger intrusions are only locally foliated. Metamorphism is recorded by the growth of zircon within Mississippian intrusions in each of the major domains at 194.76 ± 0.63 Ma (Semenof block) and 194.94 ± 0.22 Ma (domain 2). Diorite of the Lokken suite that crystallized at 195.19 ± 0.06 Ma is foliated, whereas later phases of the same suite were not penetratively deformed. Evidence for an earlier phase of metamorphism is recorded by rutile-bearing garnet amphibolite, which is exposed in two geographically restricted belts. Metamorphic zircon from a sample of garnet-rutile amphibolite yielded a date of 266.2 ± 0.8 Ma, which overlaps with the age of high-pressure (eclogite facies) metamorphism elsewhere in Yukon-Tanana Terrane.

A small, post-tectonic intrusion hosts porphyry-style molybdenum mineralization at Red Mountain (187.27 million tonnes grading 0.167% molybdenum disulphide). The age of this porphyry mineralization was confirmed by overlapping dates from the host quartz monzonite (82.18 ± 0.03 Ma; U-Pb zircon) and molybdenite (82.40 ± 0.34 Ma; Re-Os); the Red Mountain porphyry is similar in age and style to the Adanac porphyry deposit in northern BC.

BUILDING A GEOLOGICAL FRAMEWORK FOR MINERALIZATION IN EASTERN INTERIOR ALASKA THROUGH MAPPING AND GEOPHYSICAL SURVEYS

Evan Twelker, Alicja Wypych, Travis J. Naibert, Rainer J. Newberry, Michelle M. Gavel, Alec D. Wildland and Abraham M. Emond, Alaska Division of Geological & Geophysical Surveys

New Geoscience
9:45 AM – 10:05 AM

The Alaska Division of Geological & Geophysical Surveys (DGGS) is working to complete modern and detailed geological, geophysical and geochemical datasets covering the mineral-rich Yukon Tanana Upland (YTU)—a region that has produced 24 million ounces of gold and hosts further unmined resources of approximately 32 million ounces of gold. The metallogeny of the northwestern YTU is anchored by mid-Cretaceous intrusion-related gold systems (including the Fort Knox, Pogo and Money Knob deposits), whereas Late Cretaceous porphyry-related mineralization dominates the southeastern portion of the area (including the Manh Choh, Taurus and LWM deposits). Understanding the Cretaceous elements of the geological framework—including fault systems and magmatic belts—is a primary focus of DGGS's research in the YTU.

The metamorphic rocks of the YTU are a tectonic collage that includes North American protoliths and allochthonous rocks of the Yukon Tanana and Slide Mountain terranes, assembled during multiple collisional and extensional events from the Permian through the Early Cretaceous. Terrane-bounding structures and others parallel to them—mostly low-angle faults and shear zones—can provide structural preparation for later mineralizing events. Through our mapping, we have identified new structures through both direct observation and inference based on differing geological histories.

While major northwest-trending fault systems (e.g., Teslin and Big Creek faults) play a significant role in the geology and metallogeny of Yukon, the geology of the YTU in Alaska is presently dominated by northeast-trending, mostly strike-slip faults linking the Cenozoic Denali and Tintina faults. Through detailed mapping and identification of fault piercing points, DGGS is beginning to restore these younger faults to their mid-Cretaceous positions. These fault restorations suggest continuity of major northwest-trending fault systems from Yukon into Alaska. Further, these

restorations combined with new U-Pb zircon dates indicate greater continuity of mid-Cretaceous magmatic belts and associated intrusion-related mineral belts.

UPDATE ON THE STRATIGRAPHIC CONTROLS AND MINERALIZATION STYLES IN THE STIKINE TERRANE, BRITISH COLUMBIA

Luke Ootes, Bram van Straaten, Emily Miller, BC Geological Survey

New Geoscience
10:05 AM – 10:25 AM

The Stikine Terrane (Stikinia) of the Cordilleran Orogen hosts porphyry copper-gold, epithermal gold-silver, and VMS mineralization. In British Columbia, the Golden Triangle (northwest) and Toodoggone (north-central) areas, referred to by some as the Golden Horseshoe, are two localities that have known deposits and active exploration.

Stikinia's supracrustal rocks comprise three unconformity-bound units: from base to top these are the Stikine assemblage and Asitka Group (Devonian to Permian), the Stuhini and Takla groups (Upper Triassic), and the Hazelton Group (Lower to Middle Jurassic). The Stikine assemblage and Asitka Group include platformal and deep-water sedimentary rocks and remnant hints of a Devonian to Carboniferous primitive arc system. The Stuhini and Talka groups comprise mafic volcanic and associated sedimentary rocks developed in a second arc system. The Hazelton Group includes intermediate volcanic and associated sedimentary rocks and represents a third arc cycle. Porphyry mineralization is related to intrusive suites cogenetic with the Stuhini/Takla and Hazelton groups, epithermal mineralization is associated with the Hazelton Group and associated intrusive rocks, and VMS mineralization developed during the Middle Jurassic rifting of the Hazelton Arc (e.g., Eskay rift).

Derived from new bedrock mapping and targeted studies by the British Columbia Geological Survey and its partners, this presentation will summarize the state of knowledge about Stikinia's stratigraphy and hypothesize on how and why it is so well mineralized.

ULTRAMAFIC-ASSOCIATED MASSIVE SULPHIDE:A NEW CRITICAL METAL EXPLORATION TARGET IN SOUTHEAST BRITISH COLUMBIA

Mitchell G. Mihalynuk, Senior Minerals Geologist, BC Geological Survey; John R. Drobe, Exploration Manager, Wealth Minerals Ltd.

New Geoscience
10:25 AM – 10:45 AM

Discovery of black smokers astride the Galapagos mid-ocean ridge in 1977 finally ended speculation about the genesis of fossilized seafloor volcanogenic massive sulfide (VMS) deposits that had been mined for centuries. By the mid 1990s deep-sea exploration extended beyond the ridges, where a new type of VMS was discovered. These were forming on or near mantle exhumed by detachment faults and have been called 'ultramafic-hosted VMS. We prefer to call them 'ultramafic-associated' massive sulphide (UAMS) because not all the modern versions forming today, nor the fossilized versions that are found within the Lardeau Group strata of southeastern British Columbia, are

hosted by ultramafic rocks. Lardeau VMS occurrences are adjacent, not within, a previously unrecognized belt of talc-carbonate, iron-carbonate and chrome-mica schist.

Owing to their mantle association, UAMS are enriched in cobalt-nickel and gold in addition to copper-zinc-silver of typical ridge-type VMS. Size, tonnage and grade estimates for modern UAMS mounds range up to 20 by 2700 by 1600 m, approximately 40 million tonnes (Semenov, the largest known), with average grades (n = 97) of 10.5% copper, 17.6% zinc, 87.7 g/t silver, 3.5 g/t gold, 1975 g/t cobalt and 163 g/t nickel. Precious- and critical-metal enrichments and their tendency to form chains of mounds make UAMS especially attractive exploration targets. In the Lardeau area, one UAMS-bearing horizon has been traced intermittently for 15 km. So far, 20 m thicknesses of 10% copper have evaded exploration efforts, but there is much exploration still to be done.

BEYOND HOGEM: NEW REGIONAL INSIGHTS

Dejan Milidragovic, Research Scientist, Geological Survey of Canada

New Geoscience
10:45 AM – 11:05 AM

British Columbia Geological Survey's Hogem project (2018–2020) was an ambitious mapping (1:50 000) and geoscience project designed to characterize one of the most inaccessible but metallogenically (Cu±Au-Mo-Ag) prospective parts of the province. The project used Geoscience BC's recently completed Search III aeromagnetic-radiometric survey and aimed to map and sample a large area in north-central British Columbia underlain by intermediate to felsic plutonic rocks of the Hogem batholith, a composite plutonic body emplaced into the Quesnel Terrane during the Late Triassic–Early Cretaceous. The Hogem project also added important geoscience data to the regional and Cordilleran-scale geological history. The petrochronological data (U-Pb, Lu-Hf, trace elements, ±O-isotopes) from both igneous and detrital zircons contributed new information on the tectonic histories of the Quesnel, Stikine and Cache Creek terranes—data that are critical to advancing the Cordilleran puzzle. In this talk, I will summarize the highlights from several completed and ongoing studies that were made possible by the Hogem project.

CRITICAL AND BASE METALS

COPPER CREEK – EARLY HALO PORPHYRY AND BRECCIA-HOSTED CU-MO-AG DEPOSIT: AN ARIZONA COPPER DEVELOPMENT STORY

Thomas Bissig, Paul Harbidge, Dante Padilla, Zach Allwright, Angela Johnson, Faraday Copper Corp.

Critical and Base Metals
1:35 PM – 2:05 PM

The Copper Creek project, endowed with more than 3.9 billion pounds copper (measured and indicated) mineral resources, is one of the largest undeveloped copper deposits in North America. It is characterized by unique mineralization styles including breccias and early halo veins.

The project is situated in in the heart of the Laramide porphyry copper province of the Southwestern United States, in the Galiuro Mountain range, 70 km northeast of Tucson, Arizona. Mineralization is hosted in the Copper Creek batholith (62 Ma) and the Glory Hole volcanics (63 Ma).

The project considers an initial open-pit mine operation, followed by underground bulk mining. Most of the resource contained in the open pit is hosted in hydrothermal breccias, whereas the underground resource is largely contained in porphyry-style early halo veins (i.e., early dark micaceous veins), magmatic cupolas featuring miarolitic cavities filled with copper sulphides and, to a lesser extent, in hydrothermal breccias.

Unlike many other porphyry deposits of Arizona, Copper Creek has experienced limited supergene oxidation or secondary copper enrichment and is largely undeformed. Early halo veins variably overprinted by phyllic alteration are dominant, whereas A- and B-type veins, characteristic for most porphyry deposits, are subordinate.

The breccias are typically 100–400 m across and can have a vertical extent of more than 1000 m. They are somewhat varied but contain angular clasts cemented by variable proportions of quartz, carbonates and sulphides. Clastic matrix is insignificant. Quartz–coarse sericite alteration is commonly associated with high-grade breccia-hosted mineralization.

The mineralization style at Copper Creek is consistent with porphyry systems emplaced at 5–6 km crustal depth, which is deeper than many other porphyry deposits but similar to examples such as Butte Montana, Highland Valley, British Columbia, or parts of Los Pelambres, Chile.

BLUE LAKE GOLD-COPPER PORPHYRY, PAPUA NEW GUINEA: PART OF A PORPHYRY NEST IN THE KAINANTU PROJECT AREA

Chris Muller, Dean Williamson, Florence Apisai, Brendan Sasanui, K92 Mining Inc.

Critical and Base Metals
2:05 PM – 2:35 PM

Papua New Guinea hosts some of the largest and most well-endowed porphyry deposits in the Indo-Pacific region. Nearly all of those on the New Guinea mainland are situated within the Papuan fold and thrust belt, which forms the central orogen that spans the length of the island.

The Blue Lake porphyry is located approximately 4 km southwest of K92 Mining Inc.'s producing high-grade Kora and Judd intrusion-related gold deposits at the Kainantu gold mine. It was initially recognized in early February 2017, from small hand specimens of intensely argillic-altered breccia and dacite. Surficial gold-silver-copper mineralization in outcrop was identified by K92 geologists in the Blue Lake area (EL470) in September 2017. Detailed mapping and sampling ensued, with the identification of a large (1.5 by 0.8 km) coincident gold-copper soil geochemical anomaly. Drilling commenced in January 2019, and the first drillhole, KTDD0001, returned an open-ended intercept of 174.6 m at 0.28 g/t gold and 0.22% copper from 259.3 m and was terminated in mineralization at 433.9 m, as noted in a March 2019 press release. Subsequent drilling at Blue Lake has defined a large gold-copper–mineralized tonalite porphyry stock. The highest grades are associated with a potassic alteration core and is open to the southwest and at depth, with increasing grades to depth.

A significant maiden inferred resource estimate was announced in August 2022, with declaration of 10.8 million ounces AuEq at 0.61 g/t AuEq or 4.7 billion pounds CuEq at 0.38% CuEq, based on 549 million tonnes at 0.21 g/t gold, 0.23% copper and 2.42 g/t silver at a 0.4 g/t AuEq cut-off grade. This resource declaration is the fifth largest known mineralized porphyry in Papua New Guinea.

Future exploration plans at Blue Lake include drilling to target expanding the higher grade core to depth, and exploring for additional mineralized porphyries beneath an extensive composite lithocap that extends to and includes the A1 porphyry target.

THE BESKAUGA CU-AU PORPHYRY DEPOSIT, NORTHEASTERN KAZAKSTAN

Tim Barry, Darren Klinck, Joshua Hughes, Vladimir Suluburic, Svetoslav Iskakov, Rustam Khalitov and Salamat Abdrakhimov, Arras Minerals Corp.

Critical and Base Metals
2:35 PM – 3:05 PM

The Beskauga copper-gold deposit, located in Pavlodar Province, northeastern Kazakhstan, is a gold-rich, high-sulphidation epithermal copper-gold-silver deposit superimposed on a porphyry copper-gold system, either through telescoping or due to clustering of multiple porphyry centres. The bulk of the known mineralization (449.8 ± 3.7 Ma, Re-Os molybdenite) is hosted in an Ordovician diorite (453Ma ± 3 Ma, U-Pb zircon) and is located within the underexplored Bozshakol-Chingiz volcanic arc. The arc forms part of the larger Central Asian Orogenic Belt one of Earth's most richly mineralized regions. The Bozshakol-Chingiz volcanic arc also hosts KAZ Minerals plc's Bozshakol porphyry copper-gold mine only 130 km west of Beskauga (one of the largest copper resources in Kazakhstan with 1.123 billion tonnes at 0.35% copper, 0.14 g/t gold and 1.0 g/t silver in measured and indicated resources).

Several styles of mineralization occur, including disseminated and sheeted/stockwork quartz vein-hosted sulphides and minor hydrothermal breccias. The mineralization comprises tennantite, chalcopyrite, pyrite, magnetite (or hematite after magnetite) with subordinate bornite, covellite and molybdenite. Disseminated tennantite and/or pyrite occurs as halos around quartz veining. Mineralization is hosted within a sodic (albite-hematite) altered diorite that has been later overprinted by moderate to very strong argillic (illite-smectite±kaolinite-dickite) alteration and/or silicification, as well as a strongly potassic (secondary biotite–K-feldspar–magnetite–chlorite) altered monzodiorite.

Arras Minerals currently has a 30 000 m diamond drill program in progress at Beskauga, targeting the extensions of the Beskauga deposit both laterally and at depth, as well as testing multiple geophysical and geochemical targets within the wider licence area.

DEEP EXTENSIONS TO THE CERRO LOS GATOS POLYMETALLIC DEPOSIT

Tony Scott SVP of Corporate Development and Technical Services, Gatos Silver Inc.

Critical and Base Metals
3:05 PM – 3:35 PM

The Cerro Los Gatos (CLG) operation is located 120 km south of the city of Chihuahua, Mexico. The deposit was discovered in 2010 and mining and processing facilities began operating in 2019. The mineralization is considered a polymetallic epithermal deposit with silver as the dominant revenue metal and significant contributions from zinc and lead.

Prior to 2022, exploration at CLG had focused predominantly on a 400 m vertical extent of mineralization from 1400 masl down to 1000 masl. The mineralization within this elevation range displayed the typical gradation associated with this style of mineralization, starting with gold and silver at the top of the zone, progressing through zinc- and lead-rich zones and then higher copper values toward the base.

In 2022, it was recognized that definition drilling in the South-East zone was not conforming with the standard model, with silver higher in deeper drill intercepts. Significant step-out drillholes have identified different vein compositions, indicative of multiple pulses of mineralization, currently down to a depth of 800 masl and open below that.

The presentation will describe the mineral, textural and geochemical analysis that is being completed to understand the multiple pulses of mineralization and how that information is being used in exploration targeting.

LITHIUM-BEARING PEGMATITES IN WESTERN NORTHWEST TERRITORIES, CANADA

Francis MacDonald, CEO, Li-FT Power Ltd.

Critical and Base Metals
3:35 PM – 4:00 PM

Lithium pegmatites in the western Northwest Territories occur in two distinct clusters: i) the Yellowknife pegmatite province (YPP); ii) a group, known as the Little Nahanni pegmatite group (LNPG), which is situated near the NT/Yukon border.

The YPP pegmatite dikes are hosted in metasedimentary rocks of the Archean Burwash Group. Metavolcanics within the Burwash Group range in composition from basalt to rhyolite. S-type granites of the 2600 Ma Prosperous Lake suite intrude the Burwash. Pegmatites are believed to be > 2200 Ma, but there has been no systematic dating undertaken. The principal lithium mineral is spodumene with lesser amblygonite. Pegmatites are mostly simple and unzoned, consisting of quartz, feldspar, spodumene and mica. Potential for complex, zoned pegmatites hosting Be-Cs-Li-Nb-Ta is demonstrated by the Bet and Peg deposits, which were mined for tantalum. Pegmatites in YPP were first noted in 1940s. During the 1970s, explorers sampled these dikes and estimated a resource potential of approximately 44 million tonnes grading 1.40% lithium oxide to a depth of 150 m.

The LNPG consists of swarms of Cretaceous en echelon, sheeted dikes intrusive into Late Proterozoic to early Cambrian sedimentary rocks of the Hyland Group. The dikes have been classified as lithium-cesium-tantalum (LCT)

pegmatites analogous to Greenbushes pegmatites in Australia. The LNPG presents a large-tonnage lithium resource target.

The YPP has been noted to be one of the largest lithium resources in the Western world. Numerous spodumene-bearing pegmatites with strike lengths up to 1 800 m and widths up to 40 m outcrop in a spectacular fashion within the project area and are plainly visible from satellite imagery. Development of the YPP will benefit from the current lithium market conditions; excellent existing infrastructure, including roads and rail; and skilled labour in Yellowknife.

The LNPG presents a future lithium development target in a belt of world-class metal deposits.

PRECIOUS METALS

HOW GOLD DEPOSITS AND WHY IT MATTERS

Stuart Simmons, Hot Solutions Ltd and Rich Goldfarb, Goldfarb Global Gold

Precious Metals
9:10 AM – 9:35 AM

Understanding how gold deposits from hydrothermal solutions is of practical exploration interest particularly with respect to epithermal, Carlin and orogenic gold deposits.

Sulphidic hydrothermal solutions that transport gold are unremarkable in their composition except for the concentrations of dissolved metal, which are variable and rarely close to saturation except during ore formation. Chemically, gold-bearing hydrothermal solutions are commonly reduced and have a near neutral pH, but in high-sulphidation epithermal environments they might be more oxidized and more acidic. Physical and chemical perturbations in solution equilibria and/or interaction with reactive mineral surfaces, particularly arsenian pyrite, are highly conducive to gold deposition. Where gold deposits in open spaces such as veins, metal precipitation can be highly efficient, short-lived and related to episodes of strong fluid flow. In locations where gold is deposited in wallrock, involving replacement of pre-existing minerals, metal precipitation results from water-rock interaction and protracted periods of intergranular fluid flow.

The prevailing causes of gold deposition in epithermal deposits are related to sharp physical gradients that induce phase separation (boiling) and mixing. In Carlin deposits, gold deposition is controlled by surface chemistry and sorption processes onto arsenic-coated grains of pyrite. In orogenic deposits, at least two gold-depositing mechanisms appear to be capable of producing ore: one involving phase separation related to pressure cycling and the other involving water-rock interaction due to sulphidation reactions that produce pyrite and arsenopyrite. For both Carlin and orogenic deposits, significant temperature gradients and depth controls are absent, in contrast to epithermal deposits. Importantly, within a single ore-forming hydrothermal system, one or more mechanisms of gold precipitation can operate over space and time, which means that processes leading to metal anomalies encountered in the early phases of exploration might not be the same as the processes that produced orebodies that were discovered later; metallurgical differences might also be a result.

THE TUVATU HIGH-GRADE ALKALINE GOLD SYSTEM: FUNDAMENTAL CONTROLS AND UPSIDE POTENTIAL

S. Cattalani, D. Holden, W. Ostrenga, Lion One (Fiji) Limited; J. Jefferson, D. Schmidt. Center for Advanced Subsurface Earth Resource Models, Department of Geology and Geological Engineering, Colorado School of Mines

Precious Metals
9:35 AM – 10:00 AM

Tuvatu is a high-grade alkalic epithermal gold deposit on Viti Levu Island, Fiji. It is one of several precious metal deposits (including the world-class Vatakoula mine) hosted by alkalic rocks along the regional northeast-trending Viti Levu lineament. High-grade gold occurs as a complex network of veins and breccias, hosted within a monzonite stock (4.85 Ma), which intrudes an eroded shoshonite volcanic sequence.

Lion One Metals has explored Tuvatu since 2008, and has completed nearly 61 000 m of additional diamond drilling since the last mineral resource estimate in 2018. The Tuvatu deposit has a relatively small footprint extending 900 m north-south. The mineralized system is fed by at least one steeply plunging, geometrically complex, high-grade gold feeder system with a vertical extent of greater than 1000 m.

Exploration is focused on identifying fundamental controls on the nature and extent of mineralization towards predictive targeting at both the deposit and district scales. These controls include structure, alteration, mineral zonation, vein mineralogy and paragenesis, and geophysical characteristics. Ongoing research supported by Lion One has shown that gold at Tuvatu is primarily associated with late stages of a hydrothermal overprint, reflecting a telescoped system. The precipitation of gold, tellurium and base-metal sulphides occurred from an evolving fluid and late-stage flashing of silica-supersaturated and metal-laden hydrothermal fluids. The highest grade zones are focused by the intersection of multiple oriented structures and where late-stage epithermal fluids have flashed.

The understanding of the controls on mineralization at Tuvatu guides exploration throughout the district. Numerous significant occurrences indicate discrete mineralized hydrothermal cells over a 7 km strike length. There is a high probability of further discovery of other high-grade gold systems, similar in scale and tenor to Tuvatu, within the caldera.

DISCOVERY AND GEOLOGY OF THE FOURMILE DEPOSIT, CORTEZ DISTRICT, EUREKA COUNTY, NEVADA, USA

Nathan Eck, District Lead – Cortez, Nevada Gold Mines

Precious Metals
10:00 AM – 10:25 AM

The Fourmile deposit, Eureka County, Nevada, is located on the southeastern flank of the Cortez Mountains, approximately 500 m north of the Goldrush deposit. Mineralization is hosted by various breccia types, primarily within muddy limestones of the Devonian Wenban Formation. In early 2019, Barrick Gold announced an initial inferred resource of 1.17 million tonnes at 18.58 g/t for 697 000 oz of gold. Since 2019, drilling and geological

understanding has improved the resource to contain 1.0 million tonnes at 10.9 g/t for 0.35 million indicated ounces and 6.4 million tonnes at 10.6 g/t for 2.2 million inferred ounces of gold as of the end of 2021.

The structural architecture of the deposit is defined by a fault-propagated fold generated along the low-angle, west-dipping Sadler thrust fault. The carbonate strata in the hangingwall are folded into an asymmetrical, east-verging, open anticline that hosts mineralization on brecciated stratigraphic contacts of the Wenban Formation and its subunits. Mineralization also occurs along the Sadler fault and as discontinuous breccia bodies in the footwall within the north-south-¬trending, steeply west-dipping Anna fault corridor. Several types of igneous dikes occur throughout the deposit; all are interpreted to predate mineralization and can act as fluid barriers localizing high grade.

Multiple generations of breccia are observed and interpreted to be pre-, syn- and post-mineralization. Breccias are classified by matrix material and proportion as well as degree of clast rotation, with high-grade mineralization typically associated with sulphide matrix cavity fill breccia. Brecciation at Fourmile is both stratiform and cutting across stratigraphy along the strike and dip of the Anna fault corridor, creating a zoned, mushroom-shaped body around the Sadler fault-propagated anticline. Moving outward from the core, the breccia transitions from matrix supported to mosaic and then crackle, with the matrix changing from sulphide to calcite dominant.

EXPLORATION OF THE EAST TINTIC PROJECT, UTAH, USA

Maggie Layman, Jessica Shaw, John Prince, Kevin Pinkerton and Ruben Padilla, Osisko Development Corp.

Precious Metals
10:25 AM – 10:50 AM

The Tintic district is located in central Utah, 95 km south of Salt Lake City and 70 km south of Rio Tinto's Bingham Canyon mine, and is the second most productive mining district in Utah. Reported historical production of 2.9 million ounces of gold, 285 million ounces of silver, 128 000 tons of copper, 1.2 million tons of lead and 259 000 tons of zinc occurs mostly in carbonate replacement and high-sulphidation epithermal deposits.

The district is subdivided into the Main, East, Southwest and North subdistricts. Osisko Development's project is in the East Tintic subdistrict and consists of 17 000 acres of patented mining claims and mineral leases and 23 past-producing mines.

Geologically, the East Tintic subdistrict is underlain by a thick sequence of Paleozoic strata comprising shales, limestone, dolomite and quartzite of the Cambrian Tintic Quartzite and Ophir Formations. The rocks have been strongly folded into asymmetrical anticlines and synclines that have been cut by later northeast-trending strike-slip faults.

A recent discovery at the project's historical Trixie mine shows that multi-ounce gold grades of the T2 and T4 structures are associated with high-sulphidation epithermal mineralization, structurally controlled and hosted within quartzites. Test mining at Trixie is directed by underground exploration sampling and drilling. Mineralization consists of native gold and rare gold-silver–rich telluride minerals. The T4 is a mineralized stockwork zone ranging from approximately 3–25 m thick and is located in the hangingwall of the T2. T4 mineralization is gold- and silver-rich hosted by quartzite with quartz-barite-sulphosalt stockwork veining. Mineralization is currently defined over 220 m in strike and reports consistent multi-ounce gold grades along the entire strike length.

WINDFALL PROJECT: EVOLUTION OF A HIGH-GRADE WORLD-CLASS DEPOSIT

Pascal Simard, Edouard Côté Lavoie, Brandon Choquette, Julien Avard, Osisko Mining

Precious Metals
10:50 AM – 11:25 AM

The Windfall project is an advanced gold exploration project, in the Eeyou Istchee James Bay region of central-northwest Quebec, Canada. Windfall has a current combined measured and indicated resource of 4.1 million ounces at 11.4 g/t gold. The project is located in the eastern part of the Northern volcanic zone of the Abitibi Subprovince, which is part of the Archean Superior Province.

On the Windfall property, the volcanosedimentary sequence is cut by a series of younger quartz-feldspar porphyry (QFP) dikes and stocks. Uranium-lead zircon dating of pre- and post-mineral QFP intrusions constrain their emplacement to 2698 ± 3 Ma and 2697.6 ± 0.4 Ma, respectively. These intrusions also constrain the timing of the main gold event at the Windfall deposit to have occurred between a maximum of 2701–2697.2 Ma.

Two dominant styles of gold mineralization are observed in the Windfall deposit: vein-type and replacement-type mineralization. In addition, numerous remobilized gold veins crosscut these features.

From the early stages of exploration in the Windfall area, the recognition of a strong spatial and temporal relationship between gold and QFP porphyry dikes has led to the proposal that the Windfall deposit is a magmatic-hydrothermal system. The Windfall deposit is characterized as an intrusion-associated gold deposit due to the presence of unique mineralogical assemblages and the temporal and spatial association of gold with intrusive phases. The occurrence of porphyry dikes is an important criterion for the localization of the mineralization as they are proposed to have generated structural conduits in the deformed host volcanic sequence, forming ideal structural traps for the mineralizing fluids.

ADDITIONS TO THE GEOSCIENCE TOOLBOX

BRITISH COLUMBIA GEOLOGICAL SURVEY SAMPLE ARCHIVE UPDATE

Alexei S. Rukhlov, Ben Coats, Jackie N. Van der Vlugt, Isabelle J. Beaupre-Olsen, and Katya Zaborniak, BC Geological Survey

Additions to the Geoscience Toolbox
1:50 PM – 2:05 PM

The British Columbia Geological Survey (BCGS) sample archive accommodates rock, mineral and geochemical samples (rock or sediment pulp, coarsely crushed rock material, bulk sediment and sieved fractions, heavy mineral concentrates and other mineral separates) collected by BCGS staff and partner geoscience organizations from many locations throughout British Columbia during the past several decades.

These collections represent a valuable resource for BC public geoscience, supporting quality control of published data (duplicate materials), reanalysis using new, more comprehensive and precise analytical methods and new

geoscience initiatives. The BCGS sample archive supports the BCGS and other Ministry geoscience projects plus those of research partners.

The BCGS also assists external research initiatives on a case-by-case basis. The ongoing sample archive project was initiated in January 2022 following a notice to vacate the 254 Belleville Street facility in downtown Victoria. Along with moving the archive collections to the Ministry's headquarters at 1810 Blanshard Street, Victoria, work on the BCGS sample archive involved cataloguing the entire inventory of rock samples and most of the geochemical samples. To date, approximately 30 000 rock samples have been catalogued, capturing indexed cabinet tray, original sample identification and other metadata. The estimated archived geochemical inventory is more than 92 000 samples. Reanalysis of most glacial and modern drainage sediments (tens of thousands of samples) collected throughout BC since 1976 as part of the Uranium Reconnaissance Program and later the Regional Geochemical Survey underscores the value of the sample archive. We will highlight other partnership examples of using the BCGS sample archive in geoscience initiatives and outline next steps moving forward toward an interoperable, physical resource to support future research.

REGIONAL ISOTOPE PATTERNS IN YUKON: A USEFUL EXPLORATION TOOL?

Patrick Sack and Tyler Ambrose, Yukon Geological Survey

Additions to the Geoscience Toolbox
2:05 PM – 2:20 PM

Radiogenic isotopes can be used to discriminate age and compositional variation in basement rocks, as well as to help identify source rocks and contamination of magmas. From an exploration perspective, regional-scale variation in isotope patterns may be useful in delineating areas prospective for certain deposit types or related magmatic events. New Yukon Geological Survey compilations of whole rock neodymium, hafnium, strontium and feldspar lead isotopic analyses as well as sulphide lead isotope data are used to present initial ideas on basement domains in Yukon and their relevance to mineral exploration.

Three initial empirical observations based on this new compilation are:

1) Cretaceous intrusion-related and Paleozoic carbonate-hosted massive sulphide mineral occurrences in central Yukon contain galena with anomalously radiogenic lead values. These occurrences are aligned along a west-northwest trend over nearly 200 km, oblique to the near-surface structural grain. This trend is coincident with deep (> 50 km) craton margins imaged by geophysics, suggesting a long-lived regional control on the source of lead (and other metals) for these occurrences.

2) Igneous rocks of the Intermontane terranes have relatively juvenile initial ƐNd values (ƐNdi between –5 and +5). An exception to this is in west central Yukon, where plutons within the northwestern Yukon-Tanana Terrane are isotopically evolved (ƐNdi ≤ –10). This variation in neodymium isotope values may represent different basement compositions at depth, which in turn may influence metallogeny.

3) Mid-Cretaceous (120–90 Ma) plutons that intrude ancestral North American rocks are isotopically evolved with ƐNdi mostly ≤ –10 and initial strontium ≥ 0.706, whereas mid-Cretaceous plutons that intrude the Intermontane terranes are relatively juvenile with ƐNdi mostly ≥ –5 and Sri < 0.706. This variation

suggests fundamental, regional controls on magma source(s), which is reflected in the metallogeny at current crustal levels.

EXPLORING ALBERTA'S MINERAL POTENTIAL: PUBLIC GEOSCIENCE TO SUPPORT ALBERTA'S MINERAL STRATEGY

Kelsey MacCormack, Alex MacNeil, Calla Knudson, Courtney Reimert, Dean Meek, Dinu Pana, Gloria Lopez, Levi Knapp, Rastislav Elgr, Steven Lyster, Steven Pawley, Subir Chowdhury, Alberta Geological Survey; Chris Swoboda, Alberta Energy Regulator; Shoshi Soni, Alberta Energy

Additions to the Geoscience Toolbox
2:20 PM – 2:35 PM

In November 2021, the Government of Alberta released the Renewing Alberta's Mineral Future report, It is a strategy and action plan for Alberta to better understand, characterize and capitalize on its mineral potential, and outlines a path to unlock Alberta's untapped mineral resource potential. The strategy plays an important part by leveraging Alberta's natural geological advantages and details six key areas to support and achieve Alberta's vision, the first key area being to 'increase public geoscience.' This strategy has provided the Alberta Geological Survey with the unique opportunity to initiate a massive investigation and data acquisition program to compile historical mineral information that highlights and verifies potential mineral deposits, identifies knowledge gaps and collects data in strategic locations. This program has led to:

- the acquisition of one of the largest airborne geophysical surveys in the country, covering over 387 000 km2
- more than 50 000 m of scanned core
- analysis of more than 400 brine samples
- geochemical analysis of more than 5000 rock/core samples
- acquisition of targeted high-resolution satellite imagery, and
- field investigations to collect additional samples and verify analytical results.

This presentation will provide an overview of the data acquired thus far, describe some of the analyses that are underway, and provide insight into how we are leveraging online interactive platforms to make this new information and data more accessible to stakeholders. This will ensure the new regional- and local-scale geoscience information and data can be used to enhance our understanding and characterization of Alberta's mineral potential.

COSMIC-RAY MUON TOMOGRAPHY: NEW DEVELOPMENTS

Douglas Schouten, Ideon Technologies

Additions to the Geoscience Toolbox
2:35 PM – 2:50 PM

Cosmic-ray muons are charged elementary particles that arise naturally from cosmic radiation interacting with the Earth's upper atmosphere. Particle showers of muons bombard the Earth steadily and are attenuated by their interaction with matter along their trajectory.

Muons can penetrate deep into the Earth's crust, up to thousands of metres. By measuring the flux through muon detectors positioned beneath the surface, the average density in the overburden within a wide field of view above the sensors can be determined. Density anomalies can be inferred from reduced or enhanced muon flux arriving at the sensors from the surface along any given direction. By combining data from multiple locations, a detailed 3D model of underground density can be constructed. This process is known as muon geotomography.

Models of subsurface density developed by muon geotomography can be used in a wide variety of exploration and monitoring end uses for underground resources such as mineral deposits and oil reservoirs. Increasingly, the resources required to enable future technologies are being found deeper and under cover. Muon geotomography has proven capability to discover and map these resources in a cost-effective and environmentally sound manner.

Over the course of 2021 and 2022, Ideon completed development of a miniaturized muon detector and undertook several field deployments with industry. This presentation will share the latest developments in cosmic-ray muon tomography as well as early learnings from our first client imaging programs.

WHOLE-ROCK ANALYSIS WITH LASER-INDUCED BREAKDOWN SPECTROSCOPY: PAVING THE WAY TO DOWN-HOLE CHEMICAL INVESTIGATIONS

Fernando Fagundes Fontana, Ben van der Hoek, and Caroline Tiddy, University of South Australia and MinEx CRC; Steven Tassios, Francis Neil, Jessica Stromberg, and Yulia Uvarova, CSIRO and MinEx CRC

Additions to the Geoscience Toolbox
3:05 PM – 3:20 PM

Laser-induced breakdown spectroscopy (LIBS) is a well-established in situ analytical technique capable of multi-element analysis with limited to no sample preparation. Laser-induced breakdown spectroscopy has been applied to down-hole groundwater monitoring and analysis of geological materials in harsh and remote environments such as on Mars and in the deep sea. In this study, LIBS is adapted to geochemical analysis in a drillhole environment. The development of a down-hole–deployable tool for chemical analysis would represent a paradigm shift for the exploration and mining industries by enabling (near) real-time geochemical assay.

Here we demonstrate successful emulation of whole-rock geochemical assay for major elements in discrete rock types of various textures and mineralogy (13 rock samples in total) using LIBS spot data collected along continuous, 1 mm spaced transects over 1 m drill core intervals (i.e., 1000 LIBS spot analyses per metre). Results of whole-rock geochemistry from traditional laboratory assay and LIBS are remarkably similar. For instance, for silicon, differences between results do not surpass 14% for the whole sample set. Investigation of optimal LIBS sampling strategies for whole-rock analysis shows that a range in number of LIBS spot analyses are required to emulate whole-rock geochemistry within 1% error and 95% confidence (e.g., microgranite: approximately 50 spotsanalyses per metre; dolostone: approximately 560 spots per metre). The accuracy of whole-rock LIBS analysis and the optimal number of analyses are largely dependent on elemental range of distribution, grain size, and element deployment (host mineral(s) behaviour). Overall, the results of this study show promise in the development of strategies for rapid whole-rock geochemical analysis down a drillhole.

BC, YUKON AND ALASKA

MORE BANG FOR THE BUCK: BUCK PROJECT, CENTRAL BRITISH COLUMBIA

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

BC, Yukon & Alaska
9:45 AM – 10:05 AM

The Buck project, in central British Columbia, is host to the Buck Main intermediate-sulphidation, epithermal-related gold-silver-zinc system. The project is situated in a historical mining district with excellent nearby infrastructure that allows for year-round, road-accessible exploration.

The Buck project 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. The complex epithermal-related hydrothermal system at Buck Main produced three main styles of mineralization: 1) high-grade gold and silver associated with quartz-rich veins and veinlets hosted in volcaniclastic and sedimentary rocks; 2) disseminated, bulk-tonnage–style gold-silver-zinc mineralization hosted in polymictic lapilli tuffs and 3) near-surface, sphalerite-cemented hydrothermal breccias. Mineralization remains open in most directions. These distinct styles of mineralization are interpreted to be the result of the focusing of epithermal-related fluids along northwest-oriented structures or throughout permeable, volcaniclastic host rocks.

Most of the mineralization drilled to date at Buck Main consists of long, continuous zones of disseminated and breccia-hosted, bulk-tonnage–style gold-silver-zinc, such as 265 m of 1.10 g/t AuEq (BK21-033) and 241 m of 1.25 g/t AuEq (BK21-017) drilled on the eastern side of Buck Main. Vein-hosted, high-grade mineralization has also been intersected near the centre of Buck Main, highlighted by intervals such as 1.5 m of 49.6 g/t gold (BK20-012) and 0.5 m of 246 g/t gold (BK21-020).

Exploration at the Buck project is focused on investigating the lateral and vertical extent of gold-silver-zinc mineralization at the Buck Main system and defining additional drill targets across the entire land package through systematic geological, geophysical and geochemical surveys. Results from recently completed drill programs at Buck Main as well as data from ongoing project-wide exploration programs will be presented.

KLIYUL COPPER-GOLD PORPHYRY PROJECT: AN EMERGING SUCCESS STORY IN QUESNEL TERRANE, BRITISH COLUMBIA

Danette Schwab, VP Exploration and Paul Jago, Chief Geologist, Pacific Ridge Exploration Ltd

BC, Yukon & Alaska
10:05 AM – 10:25 AM

Pacific Ridge's Kliyul copper-gold porphyry project is 200 km north-northeast of Smithers within the prolific Quesnel Terrane. Nearest porphyry copper-gold deposits include Kemess (Centerra Gold Inc.), Kwanika (NorthWest Copper Corp.) and Mt. Milligan (Centerra Gold Inc.).

The property is underlain by Takla Group volcanosedimentary units. Mineralization is associated with a Late Triassic to Early Jurassic diorite to quartz monzonite suite. Sericitic alteration and related gossans follow structural controls and have attracted explorationists to the area periodically since the 1940s. The Kliyul Main zone lies near the intersection of northwest– and east-northeast–oriented principal structural trends. Four other prospects lay along the 6 km long northwest trend: Ginger, Parish Hill, Bap Ridge and M-39.

Mineralization at Kliyul comprises veined and disseminated chalcopyrite with lesser amounts of bornite. Veins include quartz-chlorite-magnetite-chalcopyrite±bornite; epidote-chalcopyrite±anhydrite, bornite; anhydrite-quartz-chalcopyrite±magnetite. Vein selvages include chlorite, albite or sericite. Mineralization is hosted by andesite and volcaniclastic andesite, also feldspar porphyry and equigranular diorite.

Pacific Ridge drilled 1510.0 m in three drillholes in 2021 and 7014.7 m in 12 drillholes in 2022. All 15 holes intersected porphyry copper-gold mineralization within a 1 400 m east-west to 400 m north-south area, extending to 630 m vertical depth.

Drill highlights include:

- 291.7 m of 0.28% copper, 0.74 g/t gold and 2.04 g/t silver (0.84% CuEq, 1.15 g/t AuEq) from 143.3 m within 437 m of 0.22% copper and 0.60 g/t gold from 12 m (KLI-21-036)
- 316.7 m of 0.30% copper, 0.70 g/t gold and 2.17 g/t silver (0.83% CuEq, 1.14 g/t AuEq) within 566.7 m of 0.20% copper and 0.44 g/t gold from 12.3 m (KLI-21-037)
- 278.0 m of 0.14% copper, 0.72 g/t gold and 0.95 g/t silver (0.67% Cu Eq, 0.92 g/t AuEq) within 588.0 m of 0.12% copper, 0.39 g/t gold and 0.90 g/t silver from 12 m (KLI-22-041).

NAK: CANADA'S NEWEST PORPHYRY DISCOVERY

Tony Moreau, CEO, and Neil Prowse, Lead Geologist, American Eagle Gold

BC, Yukon & Alaska
10:25 AM – 10:45 AM

NAK is a classic porphyry copper-gold mineralized target that exhibits many signs of a robust and large-scale system. Historical shallow drilling programs defined a near-surface copper-gold system with a footprint greater than 1.5 km by 1.5 km open and completely untested at depth. American Eagle's 6000 m, seven-hole drill program at NAK was designed to test deep geophysical targets at a depth several hundred metres below historically defined mineralization based on new interpretations from ZTEM, IP and airborne magnetic surveys.

American Eagle Gold has released some assays for its NAK copper-gold porphyry project. All seven holes drilled on NAK intersected broad intervals of porphyry-style mineralization to a depth of more than 950 m. NAK's first hole from the 2022 campaign returned 851 m of 0.37% CuEq, including 126 m of 1.05% CuEq from surface.

The NAK property is road accessible and many target areas coincide with forest industry clearcuts. Drilling can be completed year-round and no helicopter support is required. The NAK property is 85 km from Smithers, British Columbia, occurs in the Babine copper-gold porphyry district of west-central BC and is close to nearby Babine district deposits (Bell, Granisle). The proximity to excellent infrastructure and highly encouraging initial results make NAK a

prime candidate for geological investigation. The main objective is to advance this newly revitalized prospect into a major discovery.

DECAR NICKEL DISTRICT: A DISRUPTIVE NEW SOURCE OF NICKEL

Erin Wilson, P.Geo, FPX Nickel Corp

BC, Yukon & Alaska
10:45 AM – 11:05 AM

The Decar nickel district (the "District") is in central British Columbia, approximately 90 km northwest of Fort St. James, within the traditional territory of the Dakelh people of the Tl'azt'en and Binche Whut'en First Nations. The District is 100% owned by FPX Nickel Corp (FPX) and consists of 62 contiguous mineral claims covering 24 740 ha (247 km2]. The District hosts nickel mineralization in a nickel-iron mineral called awaruite (Ni3Fe), which is essentially a naturally occurring stainless steel. The District's awaruite mineralization is disseminated and relatively uniformly distributed throughout serpentinized peridotite host rocks.

Within the District, FPX has identified and drill tested four targets—Baptiste, Van, Sidney and Target B—and all have returned broadly comparable nickel mineralization and grades. The most developed of these targets is Baptiste, for which a PEA was issued in the fourth quarter of 2020 and a preliminary feasibility study (PFS) will commence in January 2023. Baptiste has been the focus of Decar drilling from 2010 to 2021, with 99 holes totalling 33 695 m drilled into the deposit.

In support of the upcoming Baptiste PFS, an updated mineral resource estimate was issued in November 2022. The updated Baptiste mineral resource incorporated 2021's in-fill drilling results as well as a new geological modelling approach that included geological sub-domaining, grade shell modelling and more accurate modelling of dilutive dikes.

The Van target, located 6 km north of Baptiste, now has 19 holes drilled for a total of 5 192 m. 2021's inaugural Van drilling campaign of nine holes yielded promising results and led to 2022's step-out drilling campaign of 10 holes. Based on results to date, the Van target has the potential to host a large-scale, standalone nickel deposit to rival the deposit already delineated at Baptiste.

ENVIRONMENTAL, SOCIAL & GOVERNANCE

EXPANDING THE CONVERSATION: EVOLVING ESG PRACTICES WITH INDIGENOUS DIVERSITY AND INCLUSION

Cara Lenoir, Indigenous Relations Strategist, Naakah Solutions Inc. and Courtnay Hughes, Senior Consultant, Equity, Diversity and Inclusion, PHC Inc.

ESG
9:00 AM – 9:30 AM

Environmental, social governance (ESG) frameworks are rapidly influencing the way financial institutes, investors, regulators and the public evaluate mineral exploration projects. Governments are seeking ways to promote and showcase projects and companies with strong ESG indicators. At the same time, defining ESG and developing its measurements have largely been an exclusionary exercise. In the public sphere there has been a lack of engagement on the topic, and confusion exists regarding what ESG is and what it is measuring.

Indigenous perspectives, values and protocols are particularly relevant for mineral explorers trying to sort this all out and have largely been ignored in the development of ESG frameworks. In this presentation, we will look at the gaps within the ESG landscape and explore potential alternatives that respect Indigenous community diversity, values and protocols. We will discuss ways in which governments, regulators, educators and other industry supports can bridge capacity gaps for smaller companies and communities.

As ESG frameworks and metrics are increasingly being used as the gold standard for social and environmental evaluations of organizations, we all need to ensure that the development and application of these frameworks and metrics are inclusive. In this presentation we will propose a broader discussion where communities are included in determining what ESG is, and Indigenous values and knowledge are respected and included in the validation of company ESG performance. ESG can be inclusive of diverse perspectives but only if a diversity of perspectives are included in the development of the framework and the evaluation of projects.

RECENT DEVELOPMENTS IN CLIMATE DISCLOSURE REGULATIONS, AND WHAT THEY MEAN FOR YOUR COMPANY

Rick Alsop, Senior Advisor – Climate Change Advisory Services, WSP Canada

ESG
9:30 AM – 10:00 AM

Investors are becoming increasingly interested in understanding how climate change can impact their portfolio. It is clear that climate change and the low-carbon transition will create risks and opportunities to businesses in all sectors, and that will in turn influence portfolio returns. Investors rely on disclosure to assess risks and opportunities to their portfolio and they are often now requiring climate-related disclosure from their portfolio companies. The recommendations of the Task Force on Climate-related Financial Disclosure (TCFD) are the current de-facto global standard climate-related disclosures to investors and were designed to enable consistent, comparable climate disclosures for investors.

The TCFD only provides a set of voluntary recommendations for climate-related disclosure, however, and as a result climate disclosures vary significantly in depth and detail, which limits comparability. At present, investors still struggle to use TCFD disclosures to make investment decisions informed by climate risk due to the lack of widely available, comparable disclosures.

In response, securities regulators have recently proposed regulations to enhance the availability, consistency and comparability of climate-related disclosures for investors. Regulations have been proposed by the U.S. Securities and Exchange Commission (SEC), the Canadian Securities Administrators (CSA) and other regulators in Europe and globally. This talk will discuss the recent developments in regulatory action on climate-related reporting, their alignment with the TCFD recommendations and a current understanding of what companies in the mining industry will need to do to comply with the regulations as proposed.

SNOWLINE GOLD: BALANCING RISK AND REWARD IN THE CONTEXT OF ESG

Steve Rennalls, Operations Manager, Snowline Gold Corp.

ESG
10:30 AM – 11:00 AM

The unique risk profile of the mineral exploration industry—with no revenue, illiquid assets, constant cash burn, outside market volatility and often a short exploration season—combined with fiduciary duty to shareholders leads many exploration companies to follow risk-averse exploration practices. Given that failure or even a misstep could ruin a company, proven methods are repeated, stifling innovation.

Meanwhile, companies bear a second responsibility: Explorers must discover and develop the resources needed for the 21st century economy in such a way that people and societies in the 22nd century and beyond do not bear the cost of current practices.

These two realities can directly conflict with one another. Snowline Gold has found early success in their reconciliation through a value-focused, principle-based approached to exploration. Creating space to discuss new ideas (including new applications of existing technology), co-creating with peers within and outside the exploration industry and finding experts to bring ideas to reality has allowed the company to reassess exploration standards. This approach has led to the pioneering use of solar energy to power an off-grid exploration camp in collaboration with the Nacho Nyak Dun Development Corporation, a new approach to progressive reclamation in collaboration with Yukon Seed and Restoration, and—perhaps most importantly—the ongoing testing of new ideas that industry can use to improve exploration practices.

NEWMONT'S APPROACH TO RELATIONSHIP BUILDING AND ESG: BRINGING 100 YEARS OF KNOWLEDGE TO BRITISH COLUMBIA

Keivan Hirji, Senior Sustainability and External Relations Specialist for North America, Newmont

ESG
11:00 AM – 11:30 AM

Environmental and social governance (ESG) is about identifying and mitigating material risks while creating value for host communities—a practice that Newmont Corporation, whose rich legacy spans most of the twentieth century and is intimately linked to many of the key industrial milestones of the 1900s, understands deeply. As the world's leading gold company and a producer of several critical minerals, Newmont has thrived in a rapidly changing world for more than a century by anticipating challenges and opportunities, learning from mistakes and demonstrating our commitment to sustainable and responsible mining.

The ability to create shared visions for positive socioeconomic and environmental outcomes is a critical skillset that Newmont has long been recognized for and without which we could not survive. Today, Newmont is proud to be consistently ranked as one of the most transparent companies in the S&P 500 and as the mining industry co-leader of the Dow Jones Sustainability Index for the 15th consecutive year.

Since acquiring Goldcorp Inc. in 2019, Newmont has maintained Vancouver, British Columbia, as its headquarters for the North America region and retained domestic talent. This presentation will provide insight into how an industry leader with a world-class portfolio of assets anchored in nine countries approaches ESG fundamentals, with a focus on relationship building and project development in the Canadian context.

ARRAS MINERALS

KAZAKHSTAN'S NEXT BIG PORPHYRY DISCOVERY

Tim Barry, Darren Klinck, Joshua Hughes, Vladimir Suluburic, Svetoslav Iskakov, Rustam Khalitov and Salamat Abdrakhimov, Arras Minerals Corp.

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 80m strike length.

ASCOT RESOURCES

PREMIER GOLD PROJECT – BUILDING CANADA’S NEXT GOLD PRODUCER

Lawrence Tsang, Senior Geologist, Ascot Resources; Lars Beggerow, VP Exploration, Ascot Resources

The Premier Gold project is located near the town of Stewart, in the southern part of British Columbia’s Golden Triangle. Ascot’s land holdings at the project exceed 25 000 ha. The combined recent and historical drilling at the Premier Gold project amounts to almost 1 million metres. During the 2022 season, Ascot completed more than 13 600 m of drilling at the Premier Gold project, focused on near mine development areas in the Day and the S-1 zones at the Big Missouri deposit and further expanded the Sebakwe exploration target located about 400 m northwest of the Premier deposit. Mineralization at Sebakwe was first outlined by geophysical IP anomalies in 2019 and drill-tested by two holes in 2021.

The Stewart mining camp is underlain by Triassic–Jurassic Stuhini Group and Hazelton Group rocks that formed in an island-arc setting. The Premier Gold deposit is 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 mineral deposit of the Premier Gold project is an intermediate sulphidation epithermal gold-silver system with subsidiary base metals. The mineralized bodies at the Premier Gold deposit are structurally controlled within quartz breccias and associated stockwork with pyrite, sphalerite, galena, chalcopyrite, electrum and coarse visible gold.

Based on the initial modelling from the 2022 Sebakwe drilling, at least two zones of gold mineralization were identified with a northwest dip, indicating the possible existence of a third structure to the north of the well-defined Northern Light and Premier mineralized structures. Drilling at the Day zone intercepted subhorizontal to shallow west-dipping quartz breccia lenses confirming the continuity of mineralization in that area. The infill drilling at Big Missouri's S-1 zone validated the resource model at the Premier Gold project and successfully extended planned stope shapes following the modelled dip of the mineralization.

ATEX RESOURCES

VALERIANO PORPHYRY: DEFINING A COPPER-GOLD GIANT IN CHILE

Raymond Jannas, CEO, ATEX Resources; Ben Pullinger, SVP Exploration and Business Development, ATEX Resources

The Valeriano project is 125 km southeast of Vallenar in the Atacama Region, Chile, and 27 km northeast of Barrick Gold Corporation's Veladero mine. Valeriano is adjacent to the El Encierro Antofagasta (51%)–Barrick (49%) joint venture. The project is within an emerging porphyry copper-gold belt—the Link Belt—located between the Maricunga and El Indio belts. The Link Belt hosts significant porphyry copper-gold deposits: Filo del Sol (Filo Mining), Josemaria (Lundin), Los Helados (NGEX Minerals/Nippon Caserones), La Fortuna (Teck/Newmont) and El Encierro.

The geological setting for Valeriano is a sequence of Permian–Triassic felsic volcanics intruded by granodioritic mineralized porphyries. The emplacement of these porphyries generated a large hydrothermal system, exhibiting a classic example of zoned alteration from the porphyry through to the epithermal setting. The lithocap above the porphyry exhibits high-level advanced argillic alteration with local epithermal gold-silver mineralization, which transitions into a well-developed potassic alteration zone within the porphyry environment. Breccias and quartz-filled stockworks are generated adjacent to and within the porphyries and host disseminated copper-gold mineralization.

Mineralization at Valeriano occurs initially as a high-sulphidation epithermal expression near surface, where primarily gold mineralization occurs within the advanced argillic alteration zone above the porphyry. This zone transitions with depth into a more copper-rich environment between the epithermal and porphyry system, where covellite replaces pyrite. Porphyry-related mineralization occurs within the porphyry stock and intrusive breccias, with copper-gold mineralization mainly as disseminated chalcopyrite and lesser bornite.

Valeriano hosts a large porphyry copper-gold deposit overlain by an oxidized epithermal gold deposit. In 2022, ATEX completed the company's first test of the porphyry. Two completed holes established a very large porphyry system and outlined a greater than 1% CuEq core.

Phase III directional drilling started in October 2022 to extend the high-grade trend, test new targets and expand the mineralized envelope.

AZIMUT EXPLORATION INC.

ELMER PROJECT: TOWARD A NEW GOLD DISTRICT IN THE JAMES BAY REGION, QUEBEC, CANADA

Jean-Marc Lulin, President and CEO, Azimut Exploration Inc.

The Elmer Property, wholly owned by Azimut, was acquired in 2018. It is located close to major infrastructure (permanent road, airport, power grid). Following on the early successes of prospecting work, a 996 m maiden drill program was completed in late 2019, with the first seven holes displaying strong gold mineralization. Subsequent programs have expanded the Patwon zone, which is now outlined over a strike length of approximately 600 m, to a vertical depth of 800 m with an average estimated true width of 35 m. This zone is geometrically robust with growth potential. A maiden NI 43-101–compliant mineral resource estimate is in preparation.

The best intervals include

- 28.0 g/t gold over 18.0 m
- 3.15 g/t gold over 102.5 m
- 3.01 g/t gold over 90.2 m
- 6.43 g/t gold over 40.6 m
- 4.43 g/t gold over 46.0 m

The steeply dipping, shear-controlled mineralized zone is mostly hosted in a felsic intrusion, as well as along the contacts of intermediate to felsic volcanics, basaltic units and gabbroic sills. The mineralization is mainly related to quartz-vein networks and their host rocks, with pyrite as the dominant sulphide mostly occurring as fine to coarse disseminations. Native gold grains are frequent. Alteration comprises pervasive silica, chlorite, sericite and tourmaline. Preliminary metallurgical tests indicate non-refractory, free-milling gold mineralization potentially easily recoverable by a combination of gravity circuit and conventional cyanide leaching. Combined gold recoveries reached 94%.

Azimut believes that other significant mineralized zones will likely be found along strike from or subparallel to the Patwon zone. The property, still largely underexplored, covers a 35 km strike length along the Lower Eastmain greenstone belt of the La Grande Subprovince in the Archean Superior Province. The exploration drilling approach is systematic, supported by the integration of a large multi-layer geoscientific dataset.

BANYAN GOLD

AURMAC: A COUNTRY ROCK–HOSTED, INTRUSION-RELATED GOLD SYSTEM

James Thom, Project Manager, Banyan Gold

Located 35 km north of Mayo, central Yukon, the AurMac property is a country rock–hosted, intrusion-related gold system. An updated mineral resource for the AurMac property of 3.99 million ounces of gold was announced on May 17, 2022. The mineral resource is contained in three near-/on-surface deposits: the Airstrip, Aurex Hill and Powerline deposits.

The three deposits are hosted within the Sourdough Hill member of the Keno Hill Quartzite Formation, along the trend of the Tombstone Plutonic Suite. The Keno Hill Quartzite Formation comprises Mississippian–Permian deep-water sediments in the Selwyn Basin most notable for the world-class Keno Hill silver deposits hosted in the Basal Quartzite member, stratigraphically below the Sourdough Hill member.

Gold mineralization is associated with pyrrhotitic retrograde skarn-like alteration, quartz-sulphosalt-arsenopyrite-pyrite veins and locally with siderite–base metal veins and breccias.

The retrograde calcsilicate alteration with pyrrhotite and gold is characterized as such: Shear and contact metamorphic-induced calcsilicate-altered calcareous sediments contain abundant pyrrhotite (locally in massive bands) along low-angle shear planes and later veins and fractures. Pyrrhotite forms > 99% of the sulphide mineralization associated with the calcsilicate alteration, with minor/trace amounts of chalcopyrite, pyrite and sphalerite. Scheelite is also common in the pyrrhotitic-rich horizons.

Quartz-sulphosalt-arsenopyrite-pyrite±gold veins tend to occur in clusters of dilatant zones, which have a west-to-southwest strike; the dip of the veins is commonly shallow to the north. The veins typically range from 5 to 20 mm in thickness. Scheelite is also common in veins.

Siderite-galena-sphalerite±arsenopyrite±gold veins and vein breccia zones are similar to those described in the Keno Hill silver district and are siderite-healed brittle fault zones with coarsely crystalline galena and marmatite sphalerite.

BRAVO MINING

LARGE-SCALE PLATINUM GROUP METAL AND NICKEL SULPHIDE MINERALIZATION WITHIN THE LUANGA MAFIC/ULTRAMAFIC COMPLEX, BRAZIL

Heinrich Müller, MGSSA, Professional Natural Scientist, Bravo Mining Corp., Vice President – Technical

Mafic-ultramafic rocks of the neo-Archaean Luanga Complex (“Luanga”) host South America’s largest known platinum group metals (PGMs) deposit. Bravo is currently working to define mineral resources along Luanga’s 8.1 km strike length.

Luanga is located within the world-class Carajás Mineral Province in Pará State, Brazil, and consists of ultramafic cumulates (Ultramafic zone), intercalated mafic and ultramafic cumulates (Transition zone) and mafic cumulates in a layered igneous sequence. The PGM mineralization is mostly contained within the Transition zone at its lower contact (Sulfide zone) with the basal ultramafics. Luanga has been overturned; as a result, a complete cross section of the stratigraphy isexposed on the surface.

The Transition zone is characterized by orthopyroxenite, harzburgite and norite and is up to 800 m thick. Platiunum group metals are locally associated with disseminated base-metal sulphides and constrained within a mineralized zone 5–60 m thick. Sulphide abundance within the Sulfide zone ranges 1–3 vol. %. Coincident PGM mineralization ranges from 1–> 20 g/t PGM + gold. The layered stratigraphy has generally been drill tested to a depth of approximately 150 m and remains open down dip.

The mineralized zone is further characterized by areas of high rhodium concentrations, with recent re-sampling of historical drill core (PPT-LUAN-FD0065) reporting 6 m @ 8.9 g/t PGM + gold, which includes 1.8 g/t rhodium, and 2 m @ 24.4 g/t PGM + gold, which includes 5.1 g/t rhodium. The Sulfide zone PGMs are predominantly associated with pentlandite, contributing appreciable amounts of sulphide nickel to the mineralized zone (approximately 0.1–0.2%).

Recent drilling also intersected the first significant massive sulphide mineralization within Luanga: 11 m at 2.0% total nickel, 1.2% copper and 4.4 g/t PGM + gold, in DDH22LU047.

Bravo is currently carrying out its Phase 1 and 2 work programs as defined in its NI 43-101 Technical Report to define what we believe to be Latin America's pre-eminent Tier-1 PGM–nickel project.

BRIXTON METALS

THORN PROJECT: AN EMERGING PORPHYRY-EPITHERMAL DISTRICT

Corey James, Brixton Metals Corp.

The Thorn project, located in northwestern British Columbia, hosts a district-scale, Triassic to Eocene, volcano-plutonic complex and related sedimentary units with several styles of mineralization related to porphyry and epithermal environments. Brixton Metals is actively exploring along this district-scale trend and the 2022 drill campaign resulted in Brixton's most significant drill intercepts to date on both its Camp Creek copper-gold-silver-molybdenum porphyry target and Trapper Gold epithermal target.

Camp Creek is a blind copper-gold-silver-molybdenum porphyry target that has been the focus of Brixton's drilling since 2011. Recent drill testing has pushed holes beyond 1000 m depths and encountered open-ended porphyry mineralization, including 967.71 m of 0.25% copper, 0.09 g/t gold, 2.39 g/t silver and 186 ppm molybdenum (0.39% CuEq) in drillhole THN22-201. Brixton continues to test the extents of this porphyry system, at depth and to the northwest, northeast and southeast.

The Trapper Gold target consists predominantly of volcanic and volcaniclastic rocks of the Upper Triassic Stuhini Group, which are intruded by Cretaceous quartz diorite, interpreted as part of the Thorn Magmatic Suite. Gold mineralization is observed within structurally controlled quartz-carbonate stockworks and epithermal veins that host sulphides (pyrite, galena, sphalerite) and rare occurrences of visible gold. To date, 76 holes have been drilled at the

Trapper target, including multiple holes with visible gold. High-grade intercepts include 64 m of 5.74 g/t gold in drillhole THN22-205 and 47 m of 1.10 g/t gold in drillhole THN22-206.

Key geological insights taken from drilling, the use of oriented core, SWIR, lithogeochemistry and geophysical rock properties (magnetic susceptibility, conductivity) have all contributed to drill targeting and expanding Brixton's district-scale potential. Drill core and rock samples will showcase the styles of mineralization and key geological features from both the Camp Creek and Trapper targets.

CORE ASSETS

BLUE PROPERTY: UNLOCKING THE POTENTIAL OF A NEW PORPHYRY–SKARN–CARBONATE REPLACEMENT DISCOVERY IN NORTHWESTERN BRITISH COLUMBIA

M. Barrington, Vice President of Exploration, Core Assets Corporation, J. Baldwin, Exploration Manager, Core Assets Corporation

Located at the centre of the Blue property in northwestern British Columbia, the Silver Lime porphyry–carbonate replacement deposit (CRD) project hosts one of the largest and highest grade surficial exposures of silver-lead-zinc–carbonate replacement massive sulphide mineralization globally.

The Silver Lime project is primarily underlain by a Proterozoic to Paleozoic metamorphosed continental margin sedimentary package comprising graphitic and mica schists, limestone and marble. Metasedimentary units are folded, locally intensely foliated and intruded by mineralized felsic-to-intermediate porphyritic stocks and dikes. Massive to semi-massive sulphide skarn and carbonate replacement mineralization appear to postdate regional metamorphism. Metal content zones outward from the Sulphide City target as zinc-copper–rich skarn, concentrated along the margins of copper-molybdenum–mineralized intrusions, to distal and dike-contact silver-lead-zinc–carbonate replacement mineralization at the Grizzly target. Carbonate replacement and skarn mineralization are observed as late fault and fracture filling, and as sulphide replacement textures in carbonate rocks, most notably along the contacts of limestone and mica schist.

In 2022, drillhole SLM-22-011, completed at the Grizzly CRD target, intersected 1.97 m of massive galena-sphalerite–rich carbonate replacement mineralization grading 661 g/t silver, 13.2% zinc, 14.0% lead, 0.27% copper and 0.22 g/t gold from 58.54 m depth, which included 1.16 m of 1145 g/t silver, 23.5% zinc, 23.2% lead, 0.52% copper and 0.37 g/t gold. These impressive intercepts show that massive sulphide mineralization is continuous from surface and indicate that base- and precious-metals grades increase locally with depth.

More than 150 surficial sulphide occurrences have been identified within a 6.6-by-1.8 km mineralized corridor at the Silver Lime porphyry-CRD project and span the complete mineralization spectrum of carbonate replacement deposits. This increases the potential for additional high-grade porphyry-skarn-carbonate replacement deposit discoveries within the western Atlin mining district of BC.

DEFENSE METALS

WICHEEDA LIGHT RARE EARTH CARBONATITE DEPOSIT

Kris Raffle, Director, Defense Metals Corp.

The 100% owned, 4244-hectare Wicheeda rare earth element (REE) property is located approximately 80 km northeast of the city of Prince George, British Columbia. The Wicheeda REE project yielded a robust 2021 preliminary economic assessment (PEA) that demonstrated an after-tax net present value (NPV at an 8% discount) of C$517 million and 18% internal rate of return. The PEA contemplates a 1.8 million tonnes per year mill throughput open pit mining operation with a 1.75:1 (waste:mill feed) strip ratio over a 19-year mine (project) life, producing and average of 25 423 t rare earth oxide annually. A Phase 1 initial pit strip ratio of 0.63:1 (waste:mill feed) would yield rapid access to higher grade surface mineralization in year 1 and payback of C$440 million initial capital within 5 years.

The Wicheeda mineral resource comprises indicated resources of 5.0 million tonnes averaging 2.95% total rare earth oxide (TREO) and inferred resources of 29.5 million tonnes averaging 1.83% TREO, reported at a cut-off grade of 0.5% TREO based on 4249 m of diamond drilling in 27 holes. Following the PEA, Defense Metals Corp. embarked on delineation and pit slope geotechnical diamond drill campaigns in 2021 and 2022 totalling 10 859 m in 47 holes. Also in 2021 and 2022, Defense Metals Corp. continued metallurgical test work focused on flotation variability across a range of grades and lithologies and the development of an alternative hydrometallurgical process that, based on initial tests, results in improved REE extraction and potential improvement in capital and operating costs.

Continued advancement of the Wicheeda REE deposit is expected to include the completion of a hydrometallurgical (acid bake process) pilot plant test campaign and initiation of a preliminary feasibility study based on recently completed diamond drilling and ongoing and planned metallurgical, geotechnical and environmental test work.

ENDURANCE GOLD

RELIANCE 'EPIZONAL' OROGENIC GOLD-ANTIMONY DISCOVERY, GOLD BRIDGE, BC

Robert T. Boyd, President, CEO & Director & Darren O'Brien, Vice President of Exploration, Endurance Gold Corporation

The Reliance gold project is located 4 km east of Gold Bridge, British Columbia, and 10 km north of the Bralorne-Pioneer gold mining camp, which has historically produced more than 4 million ounces of gold. Reliance can be accessed year-round by an all-weather road.

Gold-in-bedrock extends over at least 1500 m of strike with potential for approximately 2 km of trend associated with the Royal Shear structural complex. A total of 84 reverse circulation drillholes have been completed, totaling 6046 m. Highlights include 14.08 g/t gold over 15.4 m, 6.64 g/t gold over 30.48 m, 8.57 g/t gold over 10.66 m and 9.7 g/t gold over 12.2 m at the Eagle zone; 16.49 g/t gold over 4.6 m in a new discovery at the Diplomat zone; and 7.23 g/t gold over 4.6 m from the up-dip extension of the historical Imperial zone.

A total of 60 diamond drillholes have been completed for a total of 12 606 m drilled. Drilling expanded the Eagle area to more than 500 m of strike with highlights such as 15.7 g/t gold over 24.8 m including 26.96 g/t gold over 4.1

m, 8.62 g/t gold over 24.4 m including 17.02 g/t gold over 4.3 m, 8.06 g/t gold over 13.5 m, and 7.65 g/t gold over 12.7 m. Multiple epizonal quartz veins up to 52 m wide with associated gold mineralization have been intersected in drilling with highlights such as 8.4 g/t gold over 12.0 m from the 024 vein and 4.16 g/t gold over 30.0 m from the 037 vein.

Of the 44 diamond drill holes (with assays), 75% host significant gold intersections (> 10 gram-metre) with eight of these holes between 90 and 389 gram-metre intersections over widths between 11.9 m and 30 m. Gold is hosted in cataclastite breccia with coxcomb quartz. At least five other subparallel regional structures with confirmed gold remain to be drilled.

FARADAY COPPER

COPPER CREEK – EARLY HALO PORPHYRY- AND BRECCIA-HOSTED CU-MO-AG DEPOSIT

Thomas Bissig, Paul Harbidge, Dante Padilla, Zach Allwright, Angela Johnson, Faraday Copper Corp.

The Copper Creek project, endowed with more than 3.9 billion pounds copper (measured and indicated) mineral resources, is one of the largest undeveloped copper deposits in North America. It is characterized by unique mineralization styles including breccias and early halo veins. The early halo mineralization style at Copper Creek is consistent with porphyry systems emplaced at 5–6 km crustal depth, which is deeper than many other porphyry deposits, but similar to examples such as Highland Valley, British Columbia, or parts of Los Pelambres, Chile.

The project is situated in the heart of the Laramide porphyry copper province of the Southwestern United States, in the Galiuro Mountain range, 70 km northeast of Tucson, Arizona. Mineralization is hosted in the Copper Creek batholith (62 Ma) and the Glory Hole volcanics (63 Ma).

Unlike many other porphyry deposits in Arizona, Copper Creek has experienced limited supergene oxidation or secondary copper enrichment and is largely undeformed. Early halo veins variably overprinted by phyllic alteration are dominant, whereas A- and B-type veins, characteristic for most porphyry deposits, are subordinate. Mineralization also occurs in miarolitic cavities, which are characteristic for magmatic cupola environment.

Hydrothermal breccias overprint early halo veins, are typically 100–400 m across, and can have a vertical extent of more than 1000 m. They mostly contain angular clasts cemented by variable proportions of quartz, carbonates and sulphides. Clastic matrix is insignificant. Quartz–coarse sericite alteration is commonly associated with high-grade breccia-hosted mineralization.

Core on display is from hole FCD-22-007 (1285–1289.8 m), for which results were released on October 18th, 2022. Samples on display are from a chalcopyrite cemented breccia of the Keel zone with copper contents from 4.89–7.66%. In addition, representative samples of other mineralization styles, including early halo–style mineralization and miarolitic cavities, will be on display.

FIREWEED METALS

NEW DISCOVERY AT BOUNDARY WEST: FIREWEED PRESENTS CORE FROM BEST HOLE EVER DRILLED AT MACMILLAN PASS ZINC-LEAD-SILVER PROJECT

Moira Cruickshanks, VP Technical Services, and Jack Milton, Chief Geologist; Fireweed Metals Corporation

Fireweed is excited to present drill core from holes completed in 2022 at the Macmillan Pass zinc-lead-silver project, including core from Boundary zone hole NB22-002, the best hole ever drilled on the property, grading 12.3% zinc, 1.3% lead and 45.9 g/t silver over 124 m, including a 60 m interval of 19.0% zinc, 1.64% lead and 64.7 g/t silver.

In 2022, Fireweed completed their largest program to date—7000 m in total—including 5560 m of step-out and infill drilling at Boundary zone. A total of 23 diamond drill holes were collared—17 at Boundary Main and 6 at Boundary West—all intersecting zinc sulphide mineralization.

Boundary zone mineralization includes high-grade massive and vein-hosted sulphides as well as wide zones of lower grade disseminated sulphides hosted in Paleozoic Earn Group mudstones, volcaniclastics, conglomerates and diamictites. Laminated sulphide±barite mineralization was discovered in 2020 in older Road River Group sediments and more recently in the same Earn Group stratigraphy as the extensive laminated sulphide-barite Jason and Tom deposits located 15 km to the southeast.

Drillhole NB22-002 extended massive and vein-hosted sulphide mineralization first drilled in 2020 and 2021 and intersected a new zone of massive sulphide and mineralized volcanic rocks just 130 m vertically from surface that graded 6.15% zinc, 0.39% lead and 14.3 g/t silver over 18.52 m, including 7.41 m of 10.15% zinc, 0.73% lead and 24.3 g/t silver. Mineralization remains open in all directions and to depth, with results from this year's program informing next season's infill drill plans.

Fireweed is also displaying 2022 core from Boundary Main and Tom infill drilling, as well as core from the recently acquired Mactung project that forms part of our expanding critical metals portfolio.

FREEGOLD VENTURES

CONTINUING TO GROW: GOLDEN SUMMIT PROJECT, ALASKA

Kristina Walcott; Alvin Jackson- Freegold Ventures Limited

Golden Summit has been intermittently explored since the early 1990s. In early 2011, Freegold Ventures Limited completed an initial resource on the project based on the results of historical drilling. Between January 2011 and August 2013, 36 159 m were drilled, and a preliminary economic assessment was completed in 2016. Between 2013 and 2020, a small, shallow oxide expansion program was undertaken (1 890 m of shallow oxide drilling). Since 2020, more than 83 826 m have been drilled, which represents the most focused exploration effort ever undertaken on the Golden Summit project. The 2020–2022 drilling has focused exclusively on the Dolphin/Cleary zone, one of several target areas within the project area. During 2022, 44 holes (35 520.5 m) were drilled; the 2020–2022 drill program (83 826 m) targeted higher grade mineralization and the surrounding moderate to lower grade gold that

forms broad zones. Results continue to successfully delineate broader zones of higher grade mineralization below the depths of the proposed pit outlined in the 2016 pit-constrained resource.

Drilling and historical shallow underground mining have extended gold mineralization over 1.5 km along strike to depths of more than 1000 m. Mineralization in the Dolphin/Cleary is hosted within a broad structural corridor of gold mineralization composed of the Dolphin stock, a multiphase intrusive complex, and metasedimentary rocks comprising various schists, within which are discrete high-grade veins, veinlets and areas of vein stockwork that effectively form a vein swarm. The main Cleary Hill Vein swarm mineralization dips to the south. It plunges southwest toward the Dolphin intrusive, with the mineralization increasing in intensity closer to the Dolphin intrusive and especially along the contact margins. The Dolphin 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 Corporation's Fort Knox gold mine. Significant results from the drill program are expected to be incorporated into an updated mineral resource estimate early in 2023.

GR SILVER MINING

SAN MARCIAL: SOUTHEAST AREA DISCOVERY—A WIDE HIGH-GRADE SILVER HYDROTHERMAL BRECCIA DEFINING A NEW EXPLORATION PERSPECTIVE ON THE SOUTHWEST EDGE OF THE SIERRA MADRE OCCIDENTAL – PLOMOSAS PROJECT, ROSARIO MINING DISTRICT, SINALOA-NAYARIT-DURANGO, MEXICO

Marcio Fonseca, P.Geo., President & COO, GR Silver Mining Ltd.; Trevor Woolfe, VP Exploration and Corporate Development, GR Silver Mining Ltd.; Luis Coto, Exploration Manager, GR Silver Mining Ltd.

Recent exploration and drilling success by GR Silver Mining at San Marcial, within our Plomosas project, has revealed large, high-grade silver hydrothermal breccia systems, providing new opportunities for exploration along the southwest edge of the Sierra Madre Occidental on the triple boundary between the states of Sinaloa, Nayarit and Durango, Mexico.

Exploration drilling completed by GR Silver Mining in 2021 and early 2022 focused on expanding the existing NI 43-101 resource at San Marcial (40 million ounces silver), which consists of low to intermediate sulphidation epithermal silver-lead-zinc mineralization emplaced as breccias and stockwork zones along a northwest-southeast–trending structural control. The resource mineralization is hosted at the fault contact between a lower volcano-sedimentary unit with overlying andesitic volcanics.

In August 2022, silver mineralization hosted within a wide hydrothermal breccia and stockwork system was discovered 250 m southeast of the San Marcial resource. Further drilling around the discovery is confirming geometry, continuity and exploration potential of the newly discovered mineralization, as well as the intrinsic relationship between regional northeast-oriented faults intersecting the key northwest-southeast–trending structural zone and the hydrothermal breccia and stockwork system developed within extensional jogs, where silver sulphides are being precipitated. This target was initially identified following a maiden ground geophysical survey at San Marcial involving magnetics and three-dimensional induced polarization combined with detailed geological

mapping and a lithogeochemical sampling program over the past two years; these have combined to unlock knowledge of a new regional epithermal system on a 5 km long contact in the San Marcial area.

The integration of San Marcial with adjacent resources in the Plomosas project, where infill drilling is in progress, to form a combined NI 43-101 mineral resource estimate in the first quarter of 2023 will be a significant milestone for GR Silver Mining, consolidating resources in the most prospective areas in the Rosario mining district.

HECLA MINING CORPORATION

EXPLORATION OF THE KENO HILL SILVER DISTRICT, YUKON, CANADA

D. Chopra, Exploration Geologist, Hecla Mining Corporation; L. Stammers, P.Geo., Senior Exploration Geologist, Hecla Mining Corporation; S. Iles, Keno District Exploration Manager, Hecla Mining Corporation

Keno Hill, Yukon is Canada's second largest historical silver producing district, with 214 million ounces of silver mined at an average grade of 44 oz/t from more than 40 occurrences between 1913 and 1989. Since 2006, multi-disciplinary, district-scale exploration for high-grade silver-lead-zinc lodes over the 242 km2 project area has resulted in a current silver resource base of 87.6 million ounces indicated and 32.6 million ounces inferred. The bulk of these resources are located within the Flame & Moth and Bermingham deposits, which have a combined mining reserve of 37.19 million ounces silver (refer to https://www.hecla.com/operations/hecla-keno-hill-yukon-territory-canada).

Since the acquisition of the Keno Hill project, Hecla Mining Corporation's focus is on the development of the Bermingham and Flame & Moth deposits to bring the mine into production by the end of 2023.

In 2022, a 13 500 m reconnaissance diamond drilling program focused on the Coral Wigwam prospect confirmed the occurrence of a postulated set of favourable north-northeast–striking vein segments analogous to those that constitute the Bermingham deposit, which is situated 1 km along strike to the northeast. Assay results to date include 101.5 oz/ton silver over 7.3 ft estimated true width. Preliminary drill testing was also completed near the historical 96 million ounce silver-producing Hector-Calumet mine, where new insight gleaned from recent deep drilling at the neighbouring Bermingham deposit is suggestive of a continuation of high-grade mineralization at elevations below the existing mine levels. Initial testing was also completed at the Silver King and Silver Spoon prospects.

The mineralization is deposited in narrow, hydrothermal siderite-quartz vein-faults developed in the regionally extensive, competent but highly deformed, Mississippian Keno Hill quartzite formation. The silver minerals associated with galena and sphalerite belong predominantly to the tetrahedrite series.

HIGHGOLD MINING INC.

HIGH-GRADE JOHNSON TRACT PROJECT AND ELLIS ZONE DISCOVERY

Nathan Steeves, Chief Exploration Geologist, HighGold Mining Inc.

The high-grade gold-zinc (copper-silver-lead) JT deposit is an advanced-stage exploration target within the Johnson Tract project, 200 km southwest of Anchorage, Alaska. The property includes at least nine other high-potential mineral prospects over a 12 km strike length, including the recently discovered Ellis zone at the Difficult Creek prospect.

The JT deposit hosts an updated indicated resource of 3.49 million tonnes grading 9.39 g/t AuEq for 1.05 million ounces AuEq (5.33 g/t gold, 6.0 g/t silver, 0.56% copper, 0.67% lead and 5.21% zinc) and an inferred resource of 0.71 million tonnes grading 4.76 g/t AuEq for 0.11 million ounces (1.36 g/t gold, 9.1 g/t silver, 0.59% copper, 0.30% lead and 4.18% zinc). The indicated resource is subvertical and has an average horizontal width of 40 m, ideal geometry for low-cost mining. Metallurgical tests indicate very good metal recoveries (97% gold recovery), low impurities and negligible penalty elements.

The district-scale potential of Johnson Tract was confirmed in 2021 and 2022 with results from the newly defined Ellis zone, 4 km northeast of the JT deposit. Highlights include 10.1 g/t gold and 6.0% zinc over 14.8 m (DC22-046) and 578 g/t gold and 2203 g/t silver over 6.4 m (DC21-010). The zone has been defined over a strike length of approximately 150 m, to a depth of 100 m and is open in all directions.

Mineralization at both the JT deposit and the Ellis zone occurs as a stockwork of crustiform, cockade and/or massive polyphase quartz-sulphide±chlorite±anhydrite±carbonate veinlets and breccia in quartz, sericite and nodular to pervasive anhydrite-altered Jurassic volcaniclastic rocks. The deposits have characteristics of both intermediate sulphidation epithermal and VMS models.

Representative drill core from 2022 Ellis zone intercepts and from the new JT deposit infill drillhole JT22-152 (120.5 m at 18.76 g/t gold, 0.55% copper, 3.86% zinc, 0.93% lead) is displayed.

IRVING RESOURCES

MAIDEN DRILL RESULTS FROM HOKURYU: IRVING RESOURCES' THIRD EPITHERMAL VEIN DISCOVERY AT ITS OMU GOLD-SILVER PROJECT, HOKKAIDO, JAPAN

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

Irving Resources' Omu high-grade epithermal gold-silver vein project in Hokkaido, Japan, lies within a graben of early to mid-Miocene volcanic rocks of andesitic and rhyolitic composition. Three mineralizing centres have been identified: 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 historical mining took place at both Omui and Hokuryu immediately prior

to World War II. Irving Resources has recently undertaken diamond drilling at Hokuryu resulting in a third discovery of a high-grade vein system alongside those already found at Omui and Omu Sinter.

Highlighted vein intercepts from diamond drill hole HKR-001, completed at Hokuryu, include 3.12 g/t gold and 469.00 g/t silver (8.98 g/t AuEq) over 0.41 m, 4.27 g/t gold and 7.55 g/t silver (4.36 g/t AuEq) over 1.67 m, 6.45 g/t gold and 13.22 g/t silver (6.62 g/t AuEq) over 1.23 m and 4.07 g/t gold and 21.62 g/t silver (4.34 g/t AuEq) over 0.91 m. The deepest of these vein intercepts occurs nearly 200 m vertically beneath the historical Hokuryu mine workings. Irving plans to follow up with further drilling in 2023.

In addition to the discovery of deep veins at Hokuryu, Irving received very strong vein results from drillholes completed at West Honpi, Omui, including 7.30 g/t gold and 10.15 g/t silver (7.43 g/t AuEq) over 7.05 m from hole 21OMI-001, 15.92 g/t gold and 25.50 g/t silver (16.24 g/t AuEq) over 3.95 m and 9.70 g/t gold and 13.98 g/t silver (9.88 g/t AuEq) over 9.90 m from hole 21OMI-002 and 7.39 g/t gold and 10.07 g/t silver (7.52 g/t AuEq) over 8.58 m from hole 22OMI-001.

IVANHOE ELECTRIC

SANTA CRUZ COPPER PROJECT, ARIZONA, USA

Chris Seligman, Geology Manager – Santa Cruz; Graham Boyd, Senior VP – US Projects; Andrea Cade, Reporting Geologist, Ivanhoe Electric

The Santa Cruz deposit is in Arizona, a prolific mining state, where more than 35 million tonnes of copper have been produced since 1980 (~65% of total United States production). Ivanhoe Electric (IE) has a compelling opportunity to build a modern, low–carbon footprint, sustainable, copper-producing industrial complex in the United States.

Mineralization was first discovered in the 1970s but was largely undeveloped due to market conditions and fragmented title and ownership. In 2021, IE secured an option to acquire 100% of the mineral rights constituting the Santa Cruz project and entered into agreements to acquire further surface rights and mineral titles. Mineralization is multifaceted and consists of hypogene chalcopyrite, supergene chalcocite and oxides chrysocolla and atacamite. The supergene and oxide minerals are leachable and amenable to a solvent extraction/electrowinning (SX/EW) process allowing for direct copper cathode production.

IE completed a resource estimate with indicated resources of 2.5 million tonnes of contained copper with an average grade of 0.93% plus inferred resources of 2.3 million tonnes of contained copper with an average grade of 0.91% (effective date December 8, 2021). Based on this resource estimate, we believe that Santa Cruz is currently the second largest undeveloped copper deposit, by tonnes, in the contiguous United States with what we believe to be considerable potential to significantly expand the resources.

Deployment of our proprietary Typhoon™ exploration search technology has helped to identify new mineralized targets such as the recently announced East Ridge (November 8, 2022) and Far Southwest (November 29, 2022). The drill program at the Santa Cruz project is ongoing, with six diamond drill rigs focused on multiple areas of the Santa Cruz deposit and neighbouring exploration areas. A steady return of assay results is expected and will be incorporated into an updated mineral resource estimate expected in January 2023.

K92 MINING INC

KORA-KORA SOUTH AND JUDD-JUDD SOUTH VEIN SYSTEMS, KAINANTU GOLD MINE, EASTERN HIGHLANDS PROVINCE, PAPUA NEW GUINEA

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

The Kora-Kora South and Judd-Judd South vein systems are located in the eastern Papuan mobile belt of mainland Papua New Guinea and are part of K92's producing Kainantu gold mine. The Papuan mobile belt hosts a number of world class epithermal gold (e.g., Porgera) and porphyry copper-gold (e.g., Ok Tedi, Frieda River, Wafi/Golpu) orebodies.

The Kora-Kora South and Judd-Judd South systems are very similar and the mineralization style is of the 'intrusion-related intermediate sulphidation quartz-sulphide gold-copper vein system' type. The deposits are open in multiple directions, with an average vein thickness of 35 m and strong continuity, mining and metallurgy characteristics.

In February 2022, K92 announced an updated resource for Kora-Kora South of 2.1 million ounces at 9.20 g/t AuEq measured and indicated and 2.5 million ounces at 9.48 g/t AuEq inferred (effective date October 31, 2021) and a maiden resource for Judd-Judd South of 0.13 million ounces at 11.00 g/t AuEq measured and indicated and 0.18 million ounces at 5.66 g/t AuEq inferred (effective date December 31, 2021). The resource estimates formed the basis of K92's integrated development plan, announced in September 2022 (effective date January 1, 2022), which outlines a Stage 3 expansion definitive feasibility study (DFS) and Stage 4 expansion preliminary economic assessment (PEA) case. Both the Stage 3 DFS and Stage 4 PEA cases outline a Tier 1 asset with low all-in sustaining costs and peak annual production of 308 793 oz AuEq and 500 192 oz AuEq, respectively.

In late 2021, K92 made a major pivot from infill drilling to resource growth drilling. Results to date have significantly expanded the strike length in addition to intersecting dilatant zones. The vein systems remain open in both directions along strike and at depth, and toward the surface at Judd-Judd South. K92 plans to further increase the number of drill rigs at Kainantu in 2023.

LION ONE METALS

TUVATU HIGH-GRADE ALKALINE GOLD SYSTEM: FUNDAMENTAL CONTROLS AND UPSIDE POTENTIAL

S. Cattalani, D. Holden, W. Ostrenga, Lion One (Fiji) Limited; J. Jefferson, D. Schmidt, Center for Advanced Subsurface Earth Resource Models, Department of Geology and Geological Engineering, Colorado School of Mines

Tuvatu is a high-grade alkalic epithermal gold deposit on Viti Levu Island, Fiji. It is one of several precious metal deposits (including the world-class Vatakoula mine) hosted by alkalic rocks along the regional northeast-trending Viti Levu lineament. High-grade gold occurs as a complex network of veins and breccias hosted within a monzonite stock (4.85 Ma), which intrudes an eroded shoshonite volcanic sequence.

Lion One Metals has explored Tuvatu since 2008 and has completed nearly 61 000 m of additional diamond drilling since the last mineral resource estimate in 2018. The Tuvatu deposit has a relatively small footprint extending 900 m north-south. The mineralized system is fed by at least one steeply plunging, geometrically complex, high-grade gold feeder system with a vertical extent of greater than 1000 m.

Exploration is focused on identifying fundamental controls on the nature and extent of mineralization toward predictive targeting at both the deposit and district scales. These controls include structure, alteration, mineral zonation, vein mineralogy and paragenesis, and geophysical characteristics. Ongoing research supported by Lion One has shown that gold at Tuvatu is primarily associated with late stages of a hydrothermal overprint reflecting a telescoped system. The precipitation of gold, tellurium and base-metal sulphides occurred from an evolving fluid and late-stage flashing of silica-supersaturated and metal-laden hydrothermal fluids. The highest grade zones are focused by the intersection of multiple oriented structures and where late-stage epithermal fluids have flashed.

The understanding of the controls on mineralization at Tuvatu guides exploration throughout the district. Numerous significant occurrences indicate discrete mineralized hydrothermal cells over a 7 km strike length. There is a high probability of further discovery of other high-grade gold systems, similar in scale and tenor to Tuvatu, within the caldera.

MAG SILVER

DEER TRAIL CARBONATE REPLACEMENT DEPOSIT–SKARN–PORPHYRY PROJECT: PIUTE COUNTY, UTAH

Dr. Peter Megaw and Lyle Hansen, MAG Silver Corp; Dr. Lex Lambeck, LamSil Geological Services

MAG Silver's Deer Trail project comprises approximately 7250 ha of contiguous claims located in Piute County, Utah. It lies directly on the Tushar strand of the Wasatch-Tushar fault, the major 100 km wide structural zone separating the Great Basin from the Colorado Plateau. Farther north, this fault system hosts the Tintic and Bingham Canyon carbonate replacement deposit (CRD)-skarn-porphyry districts, all with similar ages (28–35 Ma) suggesting metallogenic affinity.

The historical Deer Trail mine exploited high-grade massive sulphide mantos hosted in thin Pennsylvanian–Permian limestones interbedded with clastic sediments. Our exploration model suggests that these irregular CRD mantos reflect leakage of mineralizing fluids from a nearby copper-molybdenum porphyry. Widespread alteration and geochemical zoning combined with numerous mineralized showings suggest the presence of two magmatic centres. Importantly, the known hostrocks are underlain regionally by the thick and clean Mississippian Redwall Limestone, a potentially a superior host for CRD and skarn mineralization, which is not exposed nor been intercepted by previous drilling in the area. The system's plumbing framework was modelled though detailed core relogging and underground mapping, highlighting inferred 'bleeder' structures connected to potentially larger deposits at depth.

Initial drilling targeted mineralized fractures projected to depth into more favourable hostrocks. Every hole cut hundreds of metres of pervasively marble- and skarn-altered Redwall Limestone and narrow high-grade sulphide mineralization. Subsequent phase 2 drilling traced interpreted alteration vectors to the west toward the inferred porphyries. The best hole displays 275 m of silver-copper-zinc–bearing sulphide 'lacing' with subintervals of higher

grade magnetite-rich skarn, all surrounded by hundreds of metres of pervasive marble and skarnoid. This intercept, the Carissa zone, points toward a promising porphyry target 2 km to the west beneath Deer Trail Mountain. Ongoing drilling will test this target in 2023, follow-up on the Carissa zone intercept and drill other targets.

MAS GOLD CORP.

DEVELOPING GOLD DEPOSITS IN THE LA RONGE GOLD BELT, SASKATCHEWAN

Darren Slugoski, Jim Engdahl and James Schulte, MAS Gold Corporation

MAS Gold Corp. holds two large claim parcels: the Preview-North property and the Greywacke Lake property. The company currently has five advanced deposits within these claim parcels that are being developed and are included in its 'hub and spoke' business model. MAS Gold Corp.'s primary deposits include North Lake, Greywacke North, Point and the recently acquired Preview SW and Contact Lake.

Mineralization at the North Lake deposit comprises broad zones of moderately northwest-dipping, sheeted, hematitic quartz veins within a competent host, 'felsite unit' (historically mapped as arkose). Higher grade zones are generally associated with higher vein densities and variable amounts of associated pyrite, pyrrhotite, magnetite and fine-grained visible gold. A systematic infill drill program was completed in 2022, successfully intersecting near-surface gold mineralization, less than 50 m below surface.

The Greywacke North deposit is hosted in arenite metasedimentary rocks located on the western edge of the MacLean Lake Group. Gold mineralization is associated with narrow lenses of trace to 3% disseminated sulphides including pyrrhotite and pyrite and traces of chalcopyrite, sphalerite and galena.

Gold mineralization at the Point deposit is hosted in multiple, steeply west-dipping, north-trending shear zones hosted in tuffaceous mafic volcaniclastic rocks. Results from the recent four holes show an extension of the Point deposit by an estimated 295 m to the south as well as down-dip extension of the deposit.

The Preview SW deposit is hosted in several subparallel, northeast-trending shear zones hosted in a diorite intrusion. Gold mineralization is strongly associated with quartz veins and veinlets as well as arsenopyrite, pyrite, chalcopyrite and pyrrhotite. The recent diamond drilling at the Preview SW successfully intersected multiple mineralized zones at depth.

MURCHISON MINERALS LTD.

EMERGING MAGMATIC NI-CU-CO SULPHIDE DISTRICT IN THE HART-JAUNE TERRANE, LAC MANICOUAGAN AREA, QUEBEC: DISCOVERY IN A BELT OF UNDEREXPLORED MAFIC TO ULTRAMAFIC ROCKS

John Shmyr, VP Exploration, Murchison Minerals Ltd.

Murchison Mineral's Haut-Plateau de la Manicouagan (HPM) project hosts multiple magmatic nickel-copper-cobalt sulphide showings, including the Barre de Fer (BDF) zone, within a 648 km2 area. The project is located approximately 60 km east of the Lac Manicouagan impact structure within an allochthonous portion of mafic igneous rocks of the Grenville Province.

The BDF zone has a strike length of 370 m; a width of 215 m, with individual mineral lenses up to 45 m thick, and mineralized intervals encountered to a depth of 475 m. Mineralized intervals at BDF include up to 121.2 m of 1.02% nickel, 0.56% copper and 0.07% cobalt in drillhole BDF22-002. Mineralization generally consists of steeply dipping disseminations and stringers of sulphide, with some zones containing intervals of net-textured sulphide, magmatic sulphide breccias and massive intervals of pyrrhotite-chalcopyrite-pentlandite within norite, gabbronorite and peridotite. Although previous work inferred that mineralization comprises translocation of disseminated sulphide formed during high-grade metamorphism, recent observations confirm the presence of primary magmatic sulphide textures.

Sulphide mineralization found to date is hosted by the Gabbro Est gabbronorite intrusions belonging to the 1.23 Ga Toulnustouk suite, which crop out in the footprint of a regional gravity anomaly. The Gabbro Est intrusion was emplaced in the Hart-Jaune Terrane, which is also composed of Mesoproterozoic anorthosites, abundant pyroxene mafic granulites, subordinate calcsilicate and metapelite rafts and gabbro sills. Multiple nickel-bearing sulphide occurrences have been identified, include the BDF zone, the PYC anomaly, and Syrah mineralized zones.

Sulphide mineralization in the HPM region was identified by Falconbridge in 1999 through reconnaissance prospecting. Drilling in 2001 confirmed the depth extent of nickel-copper-cobalt sulphide mineralization, and additional drilling was completed in 2002 and 2008, intersecting significant zones of nickel-copper-cobalt–bearing mineralization. After a lapse of 13 years, Murchison commenced exploration in 2021 and continued in 2022.

NORTHSTAR GOLD CORP.

MILLER GOLD PROPERTY, KIRKLAND LAKE ONTARIO

Northstar Gold Corp.

Northstar Gold Corp.'s (CSE:NSG; OTCQB:NSGCF) 100%-owned Miller gold property is situated 18 km southeast of Kirkland Lake and Agnico Eagle Mines Limited's Macassa SMC gold mine in northeastern Ontario. The property hosts a large-scale, near-surface bulk tonnage and high-grade, Kirkland-style alkalic intrusion-centred gold-telluride system like other deposits in the Kirkland Lake camp, which have produced more than 24 million ounces of gold from seven mines.

The Miller property's central Allied Gold zone shares important geological similarities with Agnico Eagle's nearby Macassa SMC gold mine (3.2 million tonnes @ 21.9 g/t gold; 5.2 million ounces gold past production) and Upper Beaver intrusion-hosted gold-copper deposit (proven and probable reserves of 8 million tonnes at 5.43 g/t gold, 0.25% copper). All deposits occur next to first-order fault structures within similarly aged rock formations and style of mineralization (gold-telluride vein systems ± copper and magnetite), inferring a common magmatic gold source.

Since going public by IPO in late 2019, Northstar has spent more than C$4.5 million in exploration at Miller defining and expanding the near-surface Allied Gold zone, consisting of a stacked sequence of shallowly dipping and vertical high-grade gold-telluride (copper) vein structures. Northstar has drilled 50 holes totalling 9 500 metres in two phases of drilling since 2020.

Drill core presented includes low- and high-grade intervals of gold tellurides in quartz veining from the near-surface Allied Gold zone, a large 350 m by 200 m near-surface bulk tonnage gold zone with several 70–750 g/m gold drillhole intercepts and excellent strike and depth expansion potential.

Recent (2020–2021) significant Allied Gold zone and Vein 1 drillhole intercepts include:

- MG21-70 4.4 g/t gold over 56 m
- MG21-65 9.41 g/t gold, 1.03% copper over 3.0 m
- MG21-56 6.6 g/t gold over 117 m
- MG20-49 1.43 g/t gold over 118.5 m
- MG20-47 1.17 g/t gold over 107.3 m
- MG20-46 15.45 g/t gold over 2.0 m

NORTHWEST COPPER CORPORATION

MULTIPLE STYLES OF HIGH-GRADE COPPER-GOLD MINERALIZATION IN THE SOUTH OMINECA PROJECT, NORTH-CENTRAL BRITISH COLUMBIA

Tyler Caswell, Principal Geologist; James Lang, Chief Geoscientist; Matt Manor, Geologist Special Studies; NorthWest Copper Corporation

The South Omineca project of NorthWest Copper Corporation comprises the Kwanika calcalkalic porphyry copper-gold deposit, the Stardust copper-gold carbonate replacement deposit and the Lorraine copper-gold alkalic porphyry system. The three deposits are located within 40 km of each other in north-central British Columbia, are road accessible, proximal to infrastructure and have compliant mineral resources.

The Kwanika Central zone formed at ca. 198 Ma and is hosted by Triassic Takla Group andesite and Early Jurassic quartz diorite and quartz monzodiorite intrusions of the Hogem batholith. High-grade copper-gold mineralization (> 1.5% CuEq) occurs 1) in a mostly thin zone of paleo-supergene chalcocite preserved below Cretaceous sedimentary rocks; 2) most commonly as zones of high-density quartz-pyrite-chalcopyrite-bornite veins that commonly return multi-gram gold (e.g., 235 m of 2.92% CuEq); and 3) as extremely high-grade, chalcocite-cemented breccias (e.g., 9.4 m of 33.6% CuEq) of uncertain size and orientation. The steep tabular geometry, breccias and syn-hydrothermal vein deformation indicate an intimate structural control.

The Canyon Creek zone at Stardust hosts copper-gold resources as disseminated to massive sulphide replacements (e.g., 100 m of 5.05% CuEq) of garnet skarn that had replaced limestone on the eastern flank of the Eocene Glover Stock. High-grade intersections are commonly related to pre-hydrothermal structures and favourable strata.

Lorraine copper-gold mineralization is hosted in the Early Jurassic (ca. 180 Ma) Duckling Creek Syenite Complex, a 25 km by 6 km northwest-trending intrusion within the Hogem batholith. Its copper-gold resources are hosted in pyroxenite, syenite, monzonite and diorite in the Upper Main, Lower Main and Bishop zones. High-grade mineralization (e.g., 159 m of 0.70% CuEq, and 132 m of 1.29% CuEq) occurs primarily as disseminated bornite-chalcopyrite with a variety of settings and possible controls.

Resources in each system include high-grade mineralization that provides excellent exploration targets and optionality for project advancement, including opportunities for joint development.

P2 GOLD INC.

BAM PROJECT: A NEW GOLD DISCOVERY IN THE HEART OF BC'S GOLDEN TRIANGLE

Joseph Ovsenek, President and CEO, and Ken McNaughton, Chief Exploration Officer and Director; P2 Gold Inc.

The BAM property covers more than 8100 ha of prospective ground in the Liard mining district of British Columbia's Golden Triangle. The project has good access to existing infrastructure, with Highway 37 and the Northwest Transmission Line approximately 35 km to the east of the property and the Galore Creek access road 1.7 km to the southeast.

The property is underlain by thick-bedded, Lower Permian carbonate and ankeritic brecciated dolomite along the western side of the claims and Early Mississippian granite and diorite of the More Creek intrusive complex to the east. P2 Gold optioned BAM in the spring of 2020 and later completed a soil geochemical sampling program that resulted in the discovery of the Monarch gold zone, measuring 1 km by 1 km. Drilling in 2021 showed that the mineralization at Monarch is constrained within a package of siltstones, sandstones and conglomerates, which overlie the carbonates. During the 2022 field season, P2 Gold drilled 13 958 m in 95 holes, significantly expanding the near-surface epithermal mineralization, which remains open. The gold mineralization is associated with disseminated and breccia-filling pyrite, moderate to intense quartz-sericite-pyrite alteration, a broad zone of elevated arsenic and silver, and tellurium in the siltstone/sandstone hostrocks but not the conglomerates. Polished sections of core show several generations of disseminated pyrite, multiple episodes of brecciation with quartz-carbonate filling and a late-stage brecciation with pyrite filling.

Preliminary interpretation suggests a Galore Creek–aged (205 Ma) alkaline intrusive ascended along the margins of the More Creek intrusive complex. The epithermal mineralization seen on the surface is believed to be the upper expression of that alkaline intrusive, with the mineralizing fluids travelling along regional structures. Gold grades and alteration intensity generally increase toward northeast–southwest regional structures and form halos up to 200 m away. Airborne and ground geophysical surveys show that the mineralizing structures are related to lineaments that extend to depth and are potentially the fluid pathway and/or host porphyry-style mineralization. These will be tested as part of the 2023 exploration program.

PACIFIC RIDGE EXPLORATION LTD.

KLIYUL COPPER-GOLD PORPHYRY PROJECT, BC

Danette Schwab, VP Exploration and Paul Jago, Chief Geologist, Pacific Ridge Exploration Ltd.

Pacific Ridge's Kliyul copper-gold porphyry project is 200 km north-northeast of Smithers within the prolific Quesnel Terrane. Nearest porphyry copper-gold deposits include Kemess (Centerra Gold Inc.), Kwanika (NorthWest Copper Corp.) and Mt. Milligan (Centerra Gold Inc.).

The property is underlain by Takla Group volcanosedimentary units. Mineralization is associated with a Late Triassic to Early Jurassic diorite to quartz monzonite suite. Sericitic alteration and related gossans follow structural controls and have attracted explorationists to the area periodically since the 1940s. The Kliyul Main zone lies near the intersection of northwest– and east-northeast–oriented principal structural trends. Four other prospects lay along the 6 km long northwest trend: Ginger, Parish Hill, Bap Ridge and M-39.

Mineralization at Kliyul comprises veined and disseminated chalcopyrite with lesser amounts of bornite. Veins include quartz-chlorite-magnetite-chalcopyrite±bornite; epidote-chalcopyrite±anhydrite; bornite and anhydrite-quartz-chalcopyrite±magnetite. Vein selvages include chlorite, albite or sericite. Mineralization is hosted by andesite and volcaniclastic andesite, also feldspar porphyry and equigranular diorite.

Pacific Ridge drilled 1510.0 m in three drillholes in 2021 and 7014.7 m in 12 drillholes in 2022. All 15 holes intersected porphyry copper-gold mineralization within a 1400 m east-west to 400 m north-south area, extending to 630 m vertical depth.

Drill highlights include

- 291.7 m of 0.28% copper, 0.74 g/t gold and 2.04 g/t silver (0.84% CuEq, 1.15 g/t AuEq) from 143.3 m within 437 m of 0.22% copper and 0.60 g/t gold from 12 m (KLI-21-036)
- 316.7 m of 0.30% copper, 0.70 g/t gold and 2.17 g/t silver (0.83% CuEq, 1.14 g/t AuEq), within 566.7 m of 0.20% copper and 0.44 g/t gold from 12.3 m (KLI-21-037)
- 278.0 m of 0.14% copper, 0.72 g/t gold, and 0.95 g/t silver (0.67% Cu Eq, 0.92 g/t AuEq) within 588.0 m of 0.12% copper, 0.39 g/t gold and 0.90 g/t silver from 12 m (KLI-22-041).

REGENCY SILVER

DIOS PADRE SILVER-GOLD-COPPER PROJECT, SONORA STATE, MEXICO

Michael J. Tucker, Director; Regency Silver, Bruce Bragganolo, Chairman and Director; Regency Silver

The Dios Padre property is located within northern Mexico on the southeastern corner of the State of Sonora. The property is situated on the western margin of the northern portion of the Sierra Madre Occidental. The historical Dios Padre mine on the property has a 400-year history of mining for silver. Originally operated by the Jesuits in the 1700s, the mine operated sporadically until 1984. The mine in its current state hosts a NI 43-101–compliant inferred

resource of 9.5 million ounces of silver equivalent ounces with an average grade of 236 g/t AgEq (94% silver, 6% gold) at a cutoff grade of 120 g/t AgEq.

2022 drill highlights include;

- REG-22-01: 416.5–470.3 m, 4.7 g/t gold over 53.8 m including 35.8 m of 6.84 g/t gold, 0.88% copper and 21.82 g/t silver and 13.97 g/t gold, 50.25 g/t silver and 1.11% copper over 9.8 m.
- REG-22-06: 38.15–44 m, 558.30 g/t silver over 5.85 m.
- REG-22-09: 99.4–102.5m, 420.23 g/t silver over 3.1 m.

Hole REG-22-01 targeted an IP anomaly 500 m north of the old mine workings. The hole was successful in intersecting mineralization that appears to be down dip from the Dios Padre resource. Gold-copper-silver mineralization in REG-22-01 is largely breccia hosted, with sulphides (pyrite, chalcopyrite) forming the breccia matrix. Hosted in andesites and felsic intrusives, both rock units are strongly altered to white mica with and silica. Gold and copper values correlate well with increased sulphide abundance, and coarse visible gold was found in some of the more gold-rich areas. The current hypothesis is that this zone represents a down-dip extension of the Dios Padre silver mine, where the assemblage has moved from silver-lead-zinc dominant to a gold-copper dominant down dip. Regency is highly encouraged by what these results indicate.

SABINA GOLD AND SILVER CORP.

BACK RIVER GOLD PROJECT: A DISTRICT-SCALE OPPORTUNITY

Brian May, Angus Campbell, Nicole Lasanen, Peter Regan, Mary Ann Kavanagh and Danny Coutts, Sabina Gold and Silver Corp.

Sabina's 100%-owned Back River gold project is an 80 km long banded iron formation belt, with a series of 12 gold deposits containing 9.1 million measured, indicated and inferred ounces at the Goose mine and George Lake property. The project is in southwestern Nunavut, Canada, approximately 520 km northeast of Yellowknife. Development at the Goose mine is ongoing with advanced exploration continuing elsewhere on the belt.

Structural corridors with tightly folded, steeply dipping sequences of greywacke, mudstone and banded iron formation contain mineralized zones with significant quartz veining, amphibole and chlorite alteration. Sulphidation of the host banded iron formation units produces pyrrhotite, arsenopyrite, pyrite and localized visible gold.

In 2022, approximately 3600 m of surface and underground diamond drilling was completed at the Goose mine within the Umwelt high-grade corridor. Drilling results better defined the continuity of existing resources both within and outside of the planned infrastructure. All drillholes encountered intervals of mineralization within banded iron formation.

Highlights from the spring 2022 drill program included 13.68 g/t gold over 31.90 m in hole 22GSE605, 11.93 g/t gold over 41.45 m in hole 22GSE606, 12.59 g/t gold over 45.05 m in hole 22GSE607, 21.87 g/t gold over 15.10 m in hole 22GSE610 and 12.64 g/t gold over 20.35 m in hole 22GSE611.

The 2023 exploration program will focus on the George Lake property, located approximately 60 km northwest of the Goose mine. George Lake is host to 20 km of prospective iron formation with current resources of 1.2 million indicated ounces at 5.34 g/t gold and 1.1 million inferred ounces at 6.12 g/t gold within six deposits. A 5000 m drill program will be conducted in spring 2023 targeting a combination of infill, extension and exploration targets.

See www.sabinagoldsilver.com for additional updates from 2022 and information on mineral resource estimates.

SITKA GOLD CORP.

RC GOLD PROJECT: INTRUSION-RELATED GOLD SYSTEM IN THE TINTINA GOLD PROVINCE, YUKON

Mike Burke, Sitka Gold Corp.

Located 68 km northwest of Mayo, Yukon, the RC gold project consists of a 376 km2 contiguous district-scale land package located in the road-accessible Clear Creek, Big Creek and Sprague Creek districts in the heart of Yukon's Tombstone gold belt. It is the largest consolidated land package, strategically positioned midway between Victoria Gold's Eagle gold mine—Yukon's newest gold mine, which reached commercial production in the summer of 2020—and Sabre Gold Mine's Brewery Creek project. The company recently identified a large 500 m by 2000 m gold-in-soil geochemical anomaly on the property between the Blackjack, Saddle and Eiger zones and to date has drilled 38 diamond drill holes into this system for a total of approximately 13 000 m.

Drilling has encountered gold-bearing sheeted-quartz vein mineralization over hundreds of metres in width hosted within Mayo suite mid-Cretaceous megacrystic-feldspar quartz monzonite and diorite intrusions of the Saddle and Eiger stocks, respectively, and in proximal hornfelsed Hyland Group metasedimentary rocks of the Selwyn Basin. Recent drill results include 220.1 m of 1.17 g/t gold from surface in DDRCCC-21-021; 401.5 m of 0.63 g/t gold in DDRCCC-22-038 from the Blackjack zone and 354 m of 0.41 g/t gold in DDRCCC-21-009 from the Eiger zone, 2 km to the east.

The mineralization shares many characteristics of bulk-tonnage, intrusion-related gold system deposits found throughout the Tintina Gold Province, including 1) metaluminous to peraluminous, subalkalic to alkalic, volatile-rich plutons that are intermediate to felsic; 2) tectonic setting, in deformed shelf sequences well inboard of convergent plate boundaries; 3) high gold-bismuth-tellurium correlation with variable elevated arsenic and tungsten; 4) gold mineralization emplaced post-deformation and 5) low gold grades in sheeted quartz veins within pluton.

SNOWLINE GOLD CORP.

VALLEY: UNUSUALLY HIGH-GRADE REDUCED INTRUSION-RELATED GOLD DISCOVERY IN THE YUKON'S SELWYN BASIN

Scott Berdahl, CEO & Director, Snowline Gold Corp; Sergio Gamonal, Lead Geologist, Snowline Gold Corp; Thomas Branson, Exploration Manager, Snowline Gold Corp; Craig Hart, Independent Chair, Snowline Gold Corp.

Stretching from eastern Alaska and across Yukon, the Tombstone gold belt is home to several multi-million-ounce, bulk tonnage, reduced intrusion-related gold systems (RIRGS) associated with a series of mid-Cretaceous intrusions, including Kinross's Ft Knox mine and Victoria Gold's Eagle mine. The scale, consistency and workable metallurgy of RIRGS can make them amenable to mining at gold grades well below 1 g/t.

The Valley gold system, on Snowline Gold's district-scale Rogue project in eastern Yukon, is a new RIRGS discovery with unusually high grades. Like other RIRGS, Valley hosts arrays of sheeted, gold-bearing quartz veins, in this case within a polyphase, 1 km scale granodiorite intrusion assumed to be mid-Cretaceous. Within the veins, visible gold is often located accessory to minor bismuthinite and bismuth-telluride minerals. While the metric of three to five quartz veins per metre has been used as an exploration standard for targeting ore at other RIRGS, at Valley, vein densities in the southwestern quadrant of the intrusion commonly exceed 15 veins/metre across hundreds of metres, with multiple vein generations, multiple vein orientations and, in places, almost stockwork vein textures. Vein alteration halos are commonly minor or absent, depending on vein generation and intrusive phase. The unusual densities and the overprinting vein generations appear to be responsible for the unusually high grades, with loggers noting dozens to greater than 120 separate instances of visible gold within certain holes.

Recent drill highlights at Valley include:

- 318.8 m at 2.55 g/t gold, including 108.0 m at 4.14 g/t gold from surface (V-22-010)
- 410.0 m at 1.89 g/t gold from surface (to end of hole), including 146.0 m at 3.24 g/t gold (V-22-007)
- 285.2 m at 1.45 g/t , including 128.2 m at 2.48 g/t gold from surface (V-22-014)
- 331.3 m at 1.03 g/t gold from surface, including 192.0 m at 1.52 g/t gold (V-22-005)

TDG GOLD CORP.

RE-ENVISIONING THE TOODOGGONE—BULK TONNAGE POTENTIAL AT FORMER SHASTA AU-AG MINE

Steven Kramar, VP Exploration & Christopher Dail, Senior Technical Advisor, TDG Gold Corp.

In 2020, TDG Gold acquired the 6000 ha Baker-Shasta gold-silver project, located in the road-accessible Toodoggone district, 430 km northwest of Prince George and 30 km north of Centerra's Kemess copper-gold deposits. In 2021, TDG commenced core drilling and, on May 17, 2022, TDG published a NI 43-101–compliant mineral resource. The project includes the former past-producing high-grade gold-silver Baker and Shasta mines, which operated until 2012, and the related infrastructure: (i) the Baker mill, (ii) tailings storage facility and (iii) all-season camp.

The Shasta deposit is a structurally controlled epithermal multi-phase quartz-carbonate stockwork vein and breccia system. Mineralization occurs within at least a dozen tabular to curviplanar structural corridors hosted within tuffaceous and volcaniclastic lithologies assigned to the Toodoggone Formation and consists of pyrite, acanthite, native silver and electrum. Structural elements include steeply dipping normal and potentially high-angle reverse faults that are related to deep-seated regional horst and graben structures. Mineralized zones consist of crosscutting, multi-stage quartz-calcite stockwork and breccia 'veins' up to 30 m wide, enclosed by salmon-pink potassium feldspar (adularia) alteration envelopes up to 100 m wide. Significant intercepts include broad zones of disseminated mineralization (SH21-026/194 m at 1.31 g/t gold and 26 g/t silver) and narrower, higher-grade intercepts (SH21-022/16.2 m at 8.39 g/t gold and 817 g/t silver). Data compilation and expanded coverage from high-resolution geophysical and geochemical surveying completed in 2022 indicate that Shasta may just be a portion of a potentially much larger mineralized system. This potential significantly expands the mineralized footprint outside the area of the current resource, and the broader 'Shasta Complex' will be priority for 2023 exploration.

VICTORIA GOLD

DUBLIN GULCH PROJECT, YUKON

Paul D. Gray, P.Geo.; Steve Wozniak, Geologist, Victoria Gold

Victoria Gold's Dublin Gulch property is situated in Yukon, Canada, approximately 375 km north of Whitehorse.

The property covers an area of 555 km2 and includes Victoria Gold's operating Eagle gold mine. Based on the 2019 Eagle Technical Report and after adjusting for depletion through December 31, 2021, the Eagle and Olive deposits include proven and probable reserves of 2.7 million ounces of gold from 133 million tonnes of ore with a grade of 0.64 g/t, and a mineral resource of 207 million tonnes averaging 0.63 g/t gold, containing 4.2 million gold ounces in the 'measured and indicated' category, inclusive of proven and probable reserves.

In September 2022, a maiden resource of 1.1 million ounces of gold with an average grade of 1.67 g/t was released for the Raven deposit. This achievement was the culmination of 4 years of focused exploration efforts that represents the successful application of the internally developed Potato Hills trend district exploration model.

Recent exploration programs have focused on expansion of targets near Eagle gold mine as well as the rapidly developing Raven and Lynx targets. The 2022 exploration season focused on step-out diamond drilling along strike of the previously defined extents of the Raven deposit, as well as testing areas to the south and north of Raven—a program that culminated in more than 25 000 m of diamond drilling from 91 holes in Raven and 1970 m of drilling from 6 holes in Lynx.

VIZSLA SILVER CORP.

EXPLORATION UPDATE ON THE PANUCO SILVER-GOLD DISTRICT, SINALOA, MEXICO

Jesus M. Velador VP, Exploration and Carlos Beltran Vizsla Silver Corp.

The Panuco silver-gold project is an emerging high-grade discovery located in southern Sinaloa, Mexico, near the city of Mazatlán. The 6761 ha, past-producing district contains more than 75 km of mapped and inferred veins and 35 km of underground mine workings, and benefits from the presence of roads, power, permits and a skilled workforce.

Panuco has a long history of deformation and structural preparation spanning from the Late Cretaceous to the Early Miocene, which favoured the emplacement of silver and gold mineralization in structures with multiple strike and dip orientations. The district contains intermediate to low sulphidation epithermal veins, breccias and stockwork deposits hosted in a 9 by 3 km diorite pluton and andesite-rhyolite volcanics of the Tarahumara Formation.

The past-producing district hosts an estimated in situ indicated mineral resource of 61.1 million ounces AgEq and an inferred resource of 45.6 million ounces AgEq supported by approximately 110 000 m of diamond drilling (Vizsla Silver Corp. technical report dated April 7, 2022). To date, Vizsla has completed more than 220 000 m of diamond drilling, allowing the company to significantly expand the footprint of high-grade mineralization at its Napoleon and Tajitos-Copala resource areas. Furthermore, Vizsla's team has been able to find additional silver and gold mineralization in other vein deposits within the district.

Detailed geological mapping and prospecting completed on approximately 50% of the property, including definition of 18 drill-ready targets, guarantee new discoveries in years to come. Only 33% of the known prospects have been tested to date. Continuous mapping and structural interpretations, now aided by our recently acquired lidar survey and combined with other geochemical, lithogeochemical and geochronology investigations (in progress), will allow Vizsla's team to further define vectors to more conceptual exploration targets.

VR RESOURCES LTD.

HECLA-KILMER CRITICAL METALS-REE DISCOVERY, CARBONATITE BRECCIA, NORTHERN ONTARIO

VR Resources Ltd.

The Hecla-Kilmer (H-K) REE-niobium discovery is part of a multi-property, blue-sky exploration strategy initiated by VR Resources Ltd. in 2018 toward large-footprint hydrothermal breccia systems on the Kapuskasing structural zone (KSZ), in northern Ontario. Historical exploration at H-K is minor due to the blanket of regional till in the lowland terrain; yet the nearby rail, power and highway infrastructure at Otter Rapids facilitates straightforward logistics for exploration and cost-effective drilling.

Hecla-Kilmer is a zoned, multiphase alkaline intrusive complex with carbonatite approximately 4–6 km across. It is anchored on the KSZ, a failed rift that bisects the Archean craton between James Bay and Lake Superior. The KSZ has

a long history of repeated alkaline intrusions, carbonatite and kimberlite spanning 1.6 billion years and it is a prospective intra-cratonic setting for large IOCG-IOA hydrothermal breccia systems.

VR Resources Ltd. has completed four successive drill programs at H-K since 2020, based on targeting from state-of-the-art VTEM, ground gravity and high-resolution drone-based magnetic geophysical technologies, and whole-core XRF scanning, resulting in broad and high-grade intersections up to 299 m in length with > 1% total rare earth oxides with a high proportion of magnetic REEs averaging 20% in 11 of 17 reconnaissance drillholes. The REE-niobium mineralization at H-K comes to surface, extends more than 500 m vertically and is hosted in a high-temperature, calc-potassic alteration facies. Two separate bodies 2.5 km apart within the complex have been discovered to date.

This discovery is aligned with the Ontario and Canadian governments' initiatives toward developing a domestic supply chain of critical metals. It has been awarded in both years of the Ontario Junior Exploration grant program. It has the size, composition and location for potential development to support Ontario's downstream sustainable technology industries such as electric vehicles and wind turbines.

WALLBRIDGE MINING

RIPLEY GOLD ZONE: A NEW GOLD DISCOVERY IN THE FÉNELON DISTRICT, NORTHERN ABITIBI GREENSTONE BELT

Nicolas Gaillard, Attila Pentek, and the Wallbridge Mining Exploration Team

The Ripley gold zone, in Quebec, is in the northern part of the Abitibi Subprovince, approximately 75 km west-northwest of the town of Matagami, Quebec. The property is part of the highly prospective Detour-Fénelon gold trend. It is located 1 km south of the current mineral resource footprint of the Fénelon gold deposit (Wallbridge Mining), which is estimated to contain 2.13 million ounces gold in the indicated category and 1.47 million ounces gold in the inferred category (2021 maiden mineral resource estimate; updated resource estimate to be released in the first quarter of 2023).

The Ripley mineralized system straddles the northern contact of the Sunday Lake deformation zone, a crustal-scale east-west structure that also hosts the word-class Detour Lake gold deposit in Ontario (Agnico Eagle).

Gold mineralization at Ripley typically consists of disseminated, veinlet-controlled pyrite-arsenopyrite±chalcopyrite (as well as visible gold) in silica-sericite–altered quartz diorite (Jeremie intrusion) and adjacent sedimentary rocks.

Sporadic mineralization was discovered at Ripley in the summer of 2019, during follow up on the discovery of the Fénelon Area 51 and Tabasco/Cayenne zones. The discovery hole for the Ripley zone intersected shallow gold mineralization assaying 2.83 g/t gold over 9.65 m (hole A52-19-03) near the eastern contact of the Jeremie diorite.

The drill program conducted by Wallbridge Mining in 2021–2022 aimed to further delineate the mineralized footprint of the Ripley zone. Systematic drilling revealed the continuity and pervasive nature of the gold mineralization and its close spatial association with the felsic phase of the Jeremie intrusion. The Ripley mineralized system has now been traced for a lateral distance of greater than 750 m and vertical depth of greater than 500 m. Recent significant drilling intercepts include hole FA-21-386 (two intervals grading 3.79 g/t gold over 12.40 m, and

10.32 g/t gold over 3.00 m) and hole FA-22-439 (5.33 g/t gold over 6.40 m). Exploration potential remains open in most directions (laterally and at depth).

WESTERN ALASKA MINERALS

ILLINOIS CREEK MINING DISTRICT: WATERPUMP CREEK AND THE EVOLVING CRD SYSTEM

Joe Piekenbrock, Chief Exploration Officer, Western Alaska Minerals

The Waterpump Creek (WPC) mineralization represents a major new carbonate replacement deposit (CRD) discovery by Western Alaska Minerals (WAM; WAM:TSX-V) in the Illinois Creek mining district of western Alaska, United States. The Illinois Creek mining district, which was historically exploited for gold and silver in deeply oxidized CRD gossans, is now being explored by WAM for its large-scale sulphide CRD and porphyry potential.

Drilling in 2022 has continually expanded the CRD mineralization footprint at WPC with a series of impressive holes expanding from the discovery drillhole WPC21-09, which intersected 10.5 m (9.1 m true thickness) of manto-form replacement mineralization grading 522 g/t silver, 22.5% zinc and 14.4% lead.

Assay highlights from 2022 drilling include some exceptional intervals of massive and semi-massive sulphide mineralization including 11.5 m of 337 g/t silver, 16.7% zinc, and 10.0% lead in WPC 22-11 and 101.7 m of 160 g/t silver, 5.4% zinc and 5.3% lead in WPC22-18. The footprint of the explored CRD mineralization is roughly 400–450 m along strike and 50 m in width and occurs as a gently south-plunging body. Additional assay intervals are pending. Most notably a chimney versus the more typical manto mineralization has been encountered in drillholes WPC22-17 and 18, which returned a remarkable 48.8 and 101.7 m of mineralization, respectively. Manto mineralization encountered to date consists of massive intergrown sphalerite and argentiferous galena with recrystalline dolomite, whereas chimney mineralization also presents an additional, temporally later, often brecciated pyritic component.

The WPC mineralization remains open and the broader Illinois Creek system presents numerous other CRD replacement body targets over the known system, which spans an area greater than approximately 6 × 6 km, defined in part by an extensive 2022 controlled-source audio-frequency magnetotellurics geophysical survey, shallow historical drilling and WAM's expanding soil database.

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